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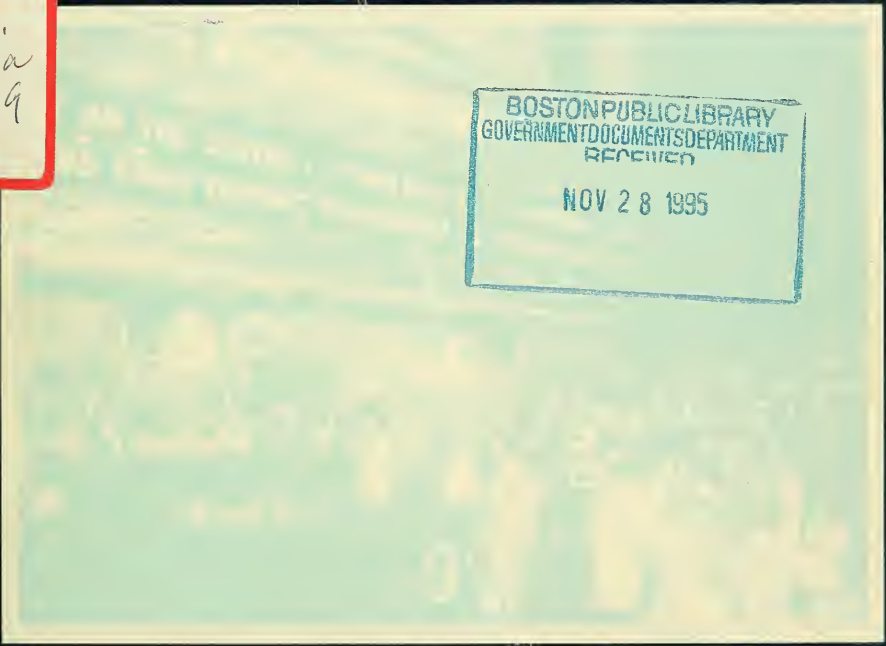

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FINAL PROJECT AND ENVIRONMENTAL IMPACT REPORT

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ASSOCIATES

ENVIRONMENTAL SERVICES:
SASAKI ASSOCIATES, INC.

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ARCHITECTURE:
KOHN PEDERSON FOX ASSOCIATES PC

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I. SUMMARY

The proposed Commonwealth Center Project, located on portions of a two block site in Boston's Midtown Cultural District, consists of three buildings of varying height, form, fenestration and materials (see Figure 1). The first site, known as Parcel 30, comprises approximately two-thirds of the block bounded by Tremont, Boylston, Avery and Washington Streets. The second site, known as the Keith Block, is located directly to the north of Parcel 30 and is an irregular corner site bounded by Washington, Avery and Mason Streets(see Figure 2).

The Proposed Project, as revised, contains a total of approximately 1.84 million gross square feet of new development. The largest building, to be located on the Parcel 30 block near the corner of Boylston and Washington Streets, will be 32 stories tall and contain approximately 830,000 gross square feet of office space. The office portion of the building will sit on top of a retail arcade containing approximately 91,000 gross square feet of retail and restaurant space. Located adjacent to the office building on the Parcel 30 block is a 13-story hotel of approximately 419 rooms. The hotel incorporates the replacement building for the Evans House into its overall hotel program. Included in the Parcel 30 program is 8,000 square feet of child care space. A below-grade garage provides parking for 1000 vehicles serving hotel guests, office workers, shoppers and night-time theater goers(see Figure 3).

A third building, located on the Keith Block at the corner of Avery and Washington Streets, will be 32 stories tall and contain approximately 580,000 gross square feet of office space and 8,400 gross square feet of retail space. Adjacent to this building is the Paramount Theater which will be converted into a 499-seat dance theater and a 199-seat studio theater.

The existing site consists of vacant land and a mix of deteriorated retail, office and residential buildings. A significant amount of built space is currently vacant and underutilized.

Proponent

Commonwealth Center Limited Partnership, a joint venture of F.D. Rich Company of Boston, Inc. and A.W. Perry, Inc.

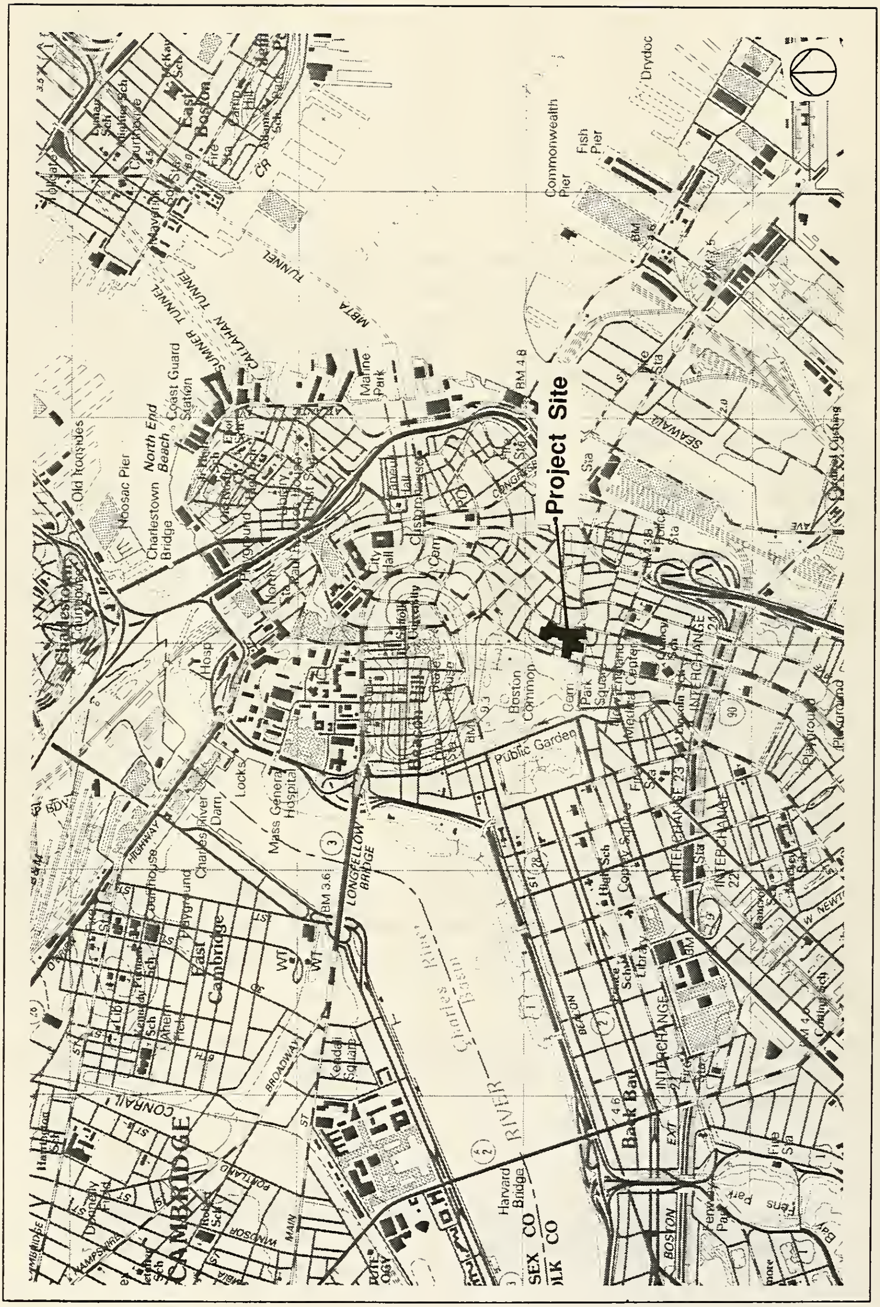

Figure 1. Locus Map

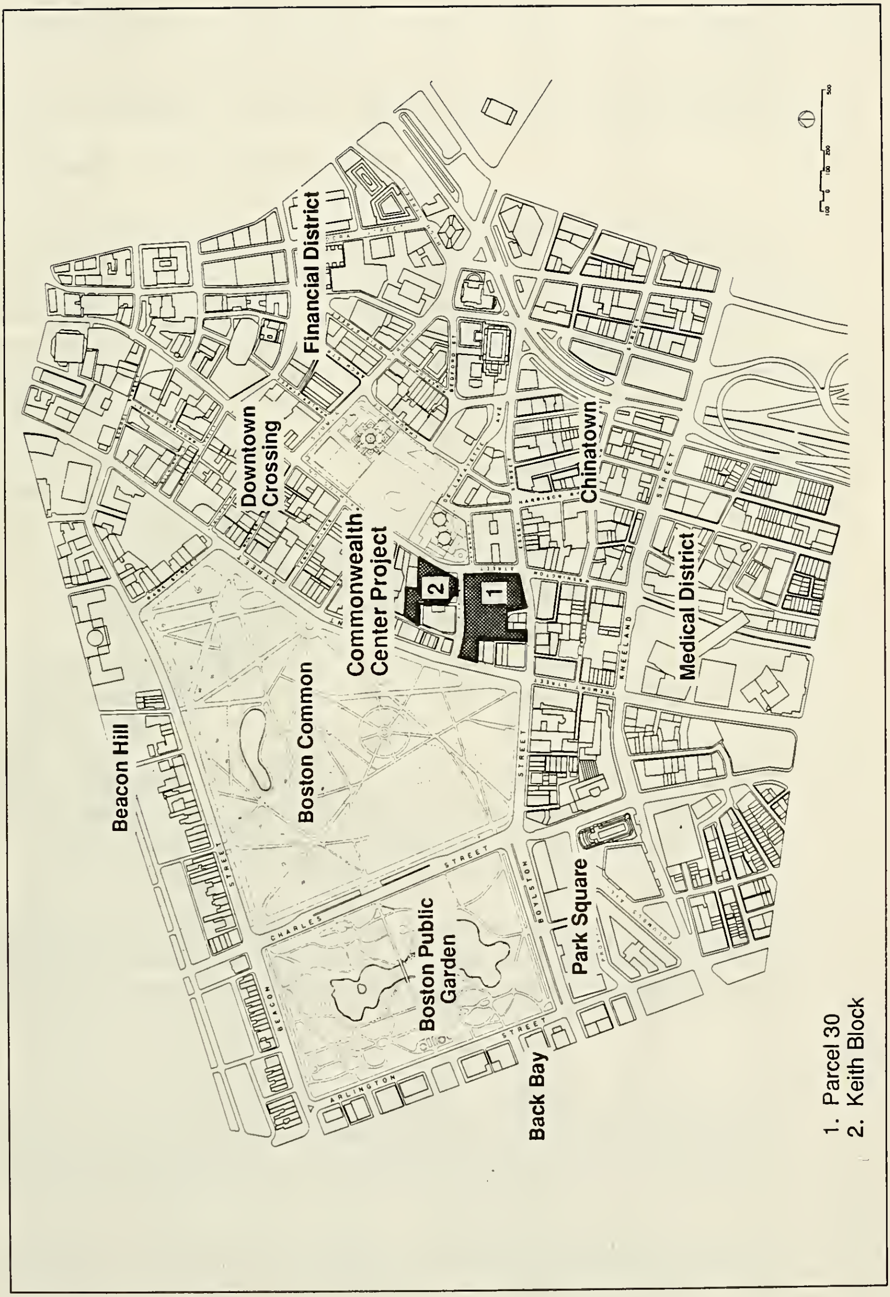

Figure 2. Project Area Map

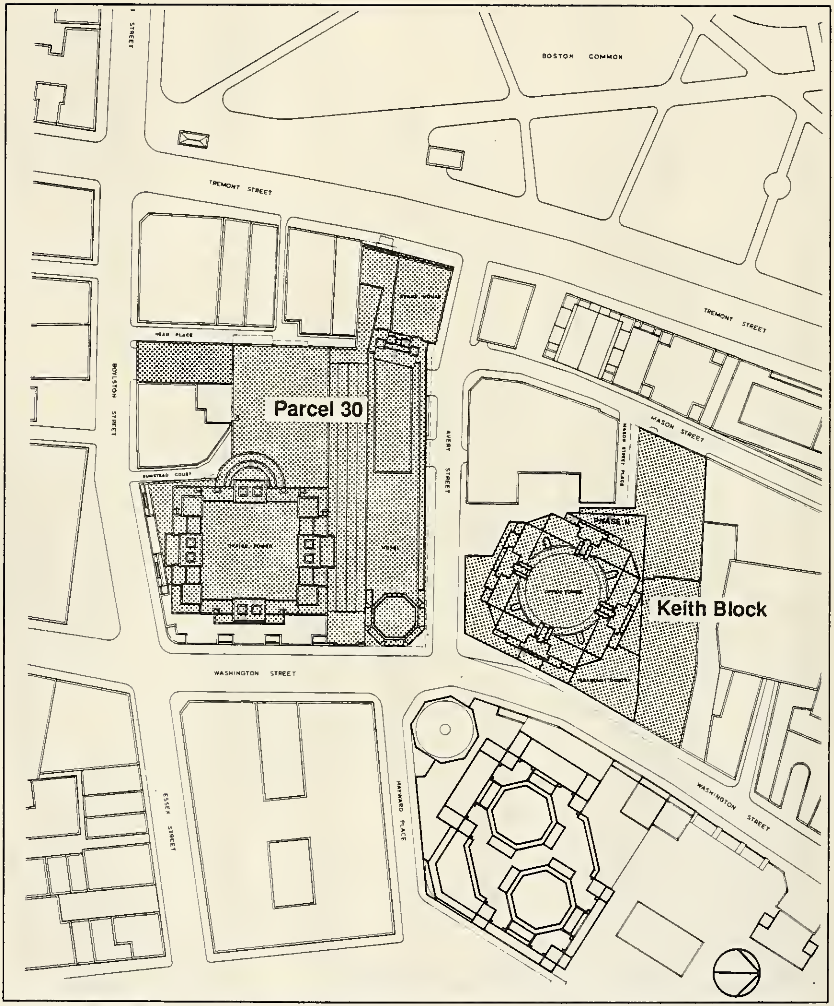

Figure 3. Proposed Commonwealth Center Project

Document Status

This document represents a combined BRA Final Project Impact Report (FPIR) and MEPA Environmental Impact Report (FEIR). The EOEA document number is 7113.

Organization of the FPIR/FEIR

The FPIR/FEIR for the Commonwealth Center Project is presented here as a single document which addresses both the comments of the Boston Redevelopment Authority (BRA) and the Secretary of Environmental Affairs of the State of Massachusetts on the previously submitted DPIR/DEIR, as well as the comments of other public agencies and interested parties. Chapter I contains general project information, including a description of the Proposed Project as revised, a summary of environmental effects, and a discussion of the Proponent's commitment to mitigation.

Chapters II-IV contain all comment letters received in response to the DPIR/DEIR. For each comment letter, the chapters include the following:

- *A copy of the original letter.* Principal comments are highlighted with sequential numbers in the left-hand column.

- *A summary of the principal comments found in each letter.* This is provided as a convenient reference to, rather than a substitute for, the original comment.

- *A response to each summarized comment.* Each response is numerically keyed to corresponding letters and comments. In reading the response, it may be helpful to reference the accompanying original letter in order to understand the full range of issues being addressed.

Chapter V, Appendices, includes all BRA, MEPA and other State and City agencies' documents, a distribution list, as well as technical material which supplements the discussion of the environmental issues raised in the various comment letters.

Project Development

As a result of comments made by various agencies concerning the site plan and building design as proposed in the DPIR/DEIR, revisions have been made to the Commonwealth Center Project. These revisions are presented in the FPIR/FEIR as the Proposed Project.

The program changes that have occurred as a result of these design changes are detailed in Table 1. The hotel program on Parcel 30 has increased from 291,120 to 321,347 s.f. with the conversion of approximately 30,000 s.f. of retail space to hotel function and administrative uses. The total hotel room count has increased slightly from 414 to 419 rooms. The retail program area has decreased from 151, 220 to 91068 s.f. on Parcel 30 and from 10,930 to 8,377 s.f. on the Keith Block. Office program area has been reduced slightly on Parcel 30 and more significantly on the Keith Block, where 67,750 square feet has been eliminated from the program. On-site day care usage has been reduced from 12,000 to 8,000 square feet, with an agreement between the Proponent and the BRA to provide the additional 4,000 square feet as part of a separate development off-site. The total program seating capacity of the cultural facilities (two theaters) and the total parking program remains the same as in the DPIR/DEIR. Overall, the total program of the Proposed Project (exclusive of the cultural facilities) has been reduced from 1.94 million square feet to 1.84 million square feet.

Table 1: Project Comparison

		Proposed Project	**Prior Proposal (DPIR/DEIR)**
Parcel 30			
	Office	830,616 SF	831,680 SF
	Hotel	321,347 SF (419 rooms)	291,120 SF (414 rooms)
	Retail	91,068 SF	151,220 SF
	Day Care	8,000 SF*	12,000 - 14,730 SF
Keith Block			
	Office	579,703 SF	644,900 SF
	Retail	8,377 SF	10,930 SF
Cultural Facilities			
	Theater 1	499 seats	499 seats
	Theater 2	199 seats	199 seats
Parking		1,000 spaces	1,000 spaces
Total Program		1.84 million SF (exclusive of cultural facilities)	1.94 million SF (exclusive of cultural facilities)

**Additional 4,000 s.f. to be provided in separate development, off-site.*

Table 2: Project Evolution

#	Year	Period	Office Bldg. Heights (ft.) Phase 1/2	Res. Bldgs. Heights(ft.) Phase 1/2	Cultural Facilities	Parking Spaces	Hotel Rooms	Project Area(sf)
1	Mid 1985	Pre-IPOD	600/400	400	none		none	
2	Spring 1987	Pre-Comm.	500/450	400/350	none	1600	250	2.4m
3	Fall 1987	Pre-PNF	400/385	295	none	1600	250	2.1m
4	May 1988	PNF/ ENF	400/385	235	2 Theatres	1200	250	1.9m
5	Oct. 1988	Pre-DPIR	400/350	none	2 Theatres	1000	414	1.9m
6	May 1989	DPIR/ DEIR	400/375	none	2 Theaters	1000	414	1.9m
7	Aug. 1989	FPIR/ FEIR	400/400	none	2 Theatres	1000	419	1.8m

SUMMARY OF ENVIRONMENTAL EFFECTS AND MITIGATION

The following is a summary of the potential environmental impacts associated with the Proposed Project, as well as mitigation measures which will be utilized to minimize any adverse environmental effects. For mitigation necessary in the vicinity of the site that has been shown to result from pending development within and adjacent to the Midtown Cultural District, including Commonwealth Center, Boston Crossing, and One Lincoln Street, the Proponent is committed to cooperate in implementation of the mitigation measures and to share proportionately in the responsibility for this implementation. For mitigation measures which are indicated for existing conditions as well as build conditions, the project proponent recommends that mitigation be shared between the pending developments and the appropriate public agencies having jurisdiction; with a proportionate sharing of costs based on the degree to which unsatisfactory existing conditions are worsened.

For mitigation that requires action by public agencies, the Proponent is committed to working cooperatively with the appropriate agencies to achieve mitigation objectives.

A. Transportation

Analyses of the effects of the Proposed Project on traffic, pedestrian, and public transit operations, as presented in the DPIR/DEIR, has been supplemented in this FPIR/FEIR.

Traffic Impacts:

Within the Study Area defined by the Scoping Requirements, and supplemented by the Preliminary Adequacy Determination, these traffic-related analyses indicate that the greatest impact under the Build and No-Build scenarios will occur at the three Study Area intersections of Boylston Street/Tremont Street, Essex Street/Harrison Avenue Extension, and of Essex Street/Surface Artery/Lincoln Street. Concurrently, analyses conducted by Boston Crossing and One Lincoln Street have identified additional intersections with combined impacts from the three projects and other background projects that necessitate some form of mitigation. These intersections include:

- Kneeland Street/Surface Artery
- Hayward Place/Avery Street/Washington Street
- Kingston Street/Bedford Street
- Church Green
- Tremont Street/Boylston Street
- Washington Street/Boylston Street
- Harrison Avenue Extension/Chauncy Street/Essex Street (Phillips Square)
- Avenue de Lafayette/Essex Street/Kingston Street
- Surface Artery/Lincoln Street/Essex Street
- Boston Crossing Garage Entry/Avenue de Lafayette
- Boston Crossing Garage Entry/Chauncy Street/Bedford Street

These intersections are also listed in Table 23 in Section of this report.

Traffic Mitigation:

On the basis of the combined impacts from the three major proposed projects, Boston Crossing, One Lincoln and Commonwealth Center, a joint mitigation program is recommended, with allocation of associated responsibilities to be borne proportionally by the three developments and in some cases by public agencies which have already identified necessary improvements as part of existing programs to meet public planning objectives.

It is proposed that existing curbside parking spaces on the southern edge of the

Boylston Street approach to the Boylston Street/Tremont Street intersection be removed for a distance of 150 feet from the intersection (a loss of approximately eight parking spaces) in order to allow for an exclusive right turn lane within the existing right-of-way. This mitigation, assuming a retiming of the signal within existing phasing, will allow for peak hour Levels of Service of "D" within the morning and afternoon peak hours. The Proponent is proposing to undertake responsibility for implementation of this mitigation.

It is proposed that the intersection of Essex Street/Harrison Avenue Extension be signalized to provide for a two-phase controller with pedestrian movement concurrent with vehicle flow. This proposed signal would provide for Levels of Service "A" in the AM Peak Hour, and "C/D" in the PM Peak Hour. The City of Boston, in its Midtown Cultural District Study (1988), has determined that signalization is required at this intersection to obtain acceptable traffic operating conditions within existing and/or future conditions. Signalization of this location is assumed to be the responsibility of the City of Boston.

The DPIR/DEIR proposed that signal operations at the intersection of Essex Street/ Surface Artery/Lincoln Street be re-phased to allow for concurrent crossing instead of the existing manually-actuated all-pedestrian phase. As a result of joint meeting among representatives of the City of Boston Department of Transportation and the Proponents of the Commonwealth Center, Boston Crossing, and One Lincoln Street developments, the intersection has been re-analyzed to reflect the following mitigation measures:

- The Essex Street eastbound approach is widened to allow for three approach lanes (instead of the existing two lanes) in conjunction with the introduction of two-direction operations on Essex Street as far west as Kingston Street.

- The northbound Lincoln Street approach is provided for four approach lanes by virtue of parking restriction implementation on both sides of Lincoln Street.

- The southbound Surface Artery approach is widened to four lanes, in conjunction with a decrease in width to two lanes on the Surface Artery northbound approach.

- Left turns on both approaches of the Surface Artery are prohibited.

These measures in conjunction with existing signal phasing which provides for an all-pedestrian phase, are projected to provide for Level of Service "C/D" operations in the AM Peak Hour and Level of Service "D" operations in the PM peak hour. Mitigations necessary at intersections of the Surface Artery are already planned as part of the Central Artery/Third Harbor Tunnel construction project and are to be undertaken by the MDPW.

In addition to the above mitigations, enforcement of existing restrictions regarding illegal parking and double parking within the Study Area is necessary to provide for acceptable operating conditions therein at No-Build and Build volume levels.

Pedestrian Impacts:

The results of analyses of pedestrian activity in the vicinity of the site display sidewalk reservoir space and cross walk service levels which are generally in the impeded and constrained range.

Pedestrian Mitigation:

As part of the construction of the Phase I site, the Project Proponent will accommodate the City's planned transportation improvemtns to reverse direction of Avery Street from its existing condition. The realignment of Avery Street can serve to increase sidewalk widths on both edges of Avery Street by six inches. The Project Proponent proposes to undertake the widening of the sidewalk on Avery Street along the Project site and will coordinate with the City for other sidewalk widenings or improvements bordering the project site in the vicinity of Avery Street and Mason Street. In addition, a widening of the sidewalk on the western edge of Washington Street by approximately three feet (see Figure 37) along the Project site is proposed by the Project Proponent. Due to the impracticality of widening the existing sidewalks in the vicinity of the site on Tremont and Boylston Streets, it is proposed instead that the crosswalks at the signalized intersections at Washington/Boylston, Tremont/Boylston and Avery/Tremont be each widened from the existing average 10 feet of width to between 18 and 20 feet; thereby doubling crosswalk capacity and easing projected constrained pedestrian conditions. The Proponent is willing to commit to the responsibility for the implementation of the above pedestrian mitigations.

Transit Impacts:

The analyses related to transit impacts indicate that all pending developments in the Midtown Cultural District will generate a total of 9,555 PM Peak Hour public transportation trips, of which an estimated 2,256 (or 24 percent) would be generated by the Proposed Project. The projected ridership impacts on the bus transit, mass transit, and commuter rail networks is expected to be offset by ongoing programs of the MBTA and private service providers to add additional buses and rail cars as demand warrants, as well as via MBTA programs to expand Red, Orange, and Green line station capacities through platform extensions to accommodate larger trains.

Transit Mitigation:

Any residual peak demand not met by the above measures is expected to be met by on-site employer and business operations' implementation of staggered operating hours and/or flexible employee arrival and departure times. These measures would help to alleviate potential crush loadings within a limited amount of time in the peak hours, particularly during the PM Peak Hour immediately after 5:00 PM. A more evenly spread demand over the course of the peak hour would prove more efficient in utilizing total capacity during that time.

B. Wind

Impacts:

The seasonal analysis of the proposed Commonwealth Center project, per the DPIR/DEIR design and the amended design contained in this FPIR/FEIR, shows that the most probable high-speed winds will occur during the winter and spring months. The design tested in the DPIR/DEIR recorded locations exceeding the BRA's 31 miles per hour (mph) one percent gust velocity guideline four times on the annual basis and six times on the seasonal basis. The amended design with the revised Boston Crossing project resulted in the BRA's 31 mph guideline being exceeded five times on the annual basis and seven times on the seasonal basis. Although wind speeds appear to increase in comparison with the DPIR/DEIR results, the amended design for the Commonwealth Center project and revised Boston Crossing Project has effectively reduced wind speeds in comparison to conditions tested for the Boston Crossing DPIR/DEIR.

Mitigation:

Based on the amended design as presented in the FPIR/FEIR, three sensor locations at which wind gust velocities exceed the BRA standard have been identified as resulting from the Proposed Project in conjunction with existing and background projects. They are:

- At the corner of Boylston and Tremont Streets, sensor location #5.
- At the southeast corner of Parcel 30, sensor location #4.
- At the entrance to 600 Washington Street near the southeast corner of Parcel 30, sensor location #17.

Sensor Location #5

In comparison with the results of the previous wind velocity analysis presented in the DPIR/DEIR, the revision of the north tower design on the Keith Block and the lowering of the Parcel 30 retail arcade has dramatically reduced the exceedence of the 31 mph, annual 1% gust velocity at sensor location #5 on the corner of Boylston and Tremont Streets. Under the revised design, the effective gust velocity for this sensor location was measured at 31.3 mph compared to 35.1 mph measured for the same location under the previous design presented in the DPIR/DEIR. No further feasible means of wind velocity reduction has been found, except for heavy tree planting on the Boston Common. With the new tree plantings proposed by the Department of Parks and Recreation for the Boston Common, an improvement in existing conditions may be effected, further reducing the effects generated for the Proposed Project scenario. It should be noted that for both No-Build conditions tested for this sensor location (DPIR/DEIR and FPIR/FEIR), wind gust velocities exceed the velocity measured for the revised design Build Scenario.

Sensor Location #4

The mitigation testing procedure at the southeast corner of the Parcel 30 office building (Sensor #4), where southwest winds intensified along the pedestrian level, included testing canopies, banners, and tree planting until the proper combination was found to ameliorate the adverse wind conditions. Combinations of canopies and vertical banners on the Parcel 30 southern facade provided no workable solution. By planting four to five trees (20 foot high) along the north side of Boylston Street from the Franciscan Building to Washington Street (see Figures 4 and 5), the energy of the lateral flow dissipated, thereby reducing the velocities at sensor 4 from 29.8 mph to 25.00 mph annually and from 31.8 mph to 26.6 mph on the maximum seasonal basis. The Project Proponent proposes to undertake the planting of five trees, the location of which are indicated along Boylston Street at the Project site as part of the Project's sidewalk and landscaping plan (see Figure 4).

Sensor Location #17

Solving the situation across the street along Washington Street (Sensor #17) must be approached by altering the conditions in the immediate area. Attempts to "trip" or redirect the flow by vertical banners and canopies on the southern facade of Parcel 30 were unsuccessful. The solution to the problem involves planting four to five trees (20 feet high) spaced along Washington Street from Hayward Place to Washington Street (see Figures 4 and 5). Testing demonstrated a reduction of windspeeds from 29.9 mph to 26.3 mph annually and from 31.9 mph to 28.2 mph, based on peak seasonal 1% gust velocity. A combination of two vertical canopies

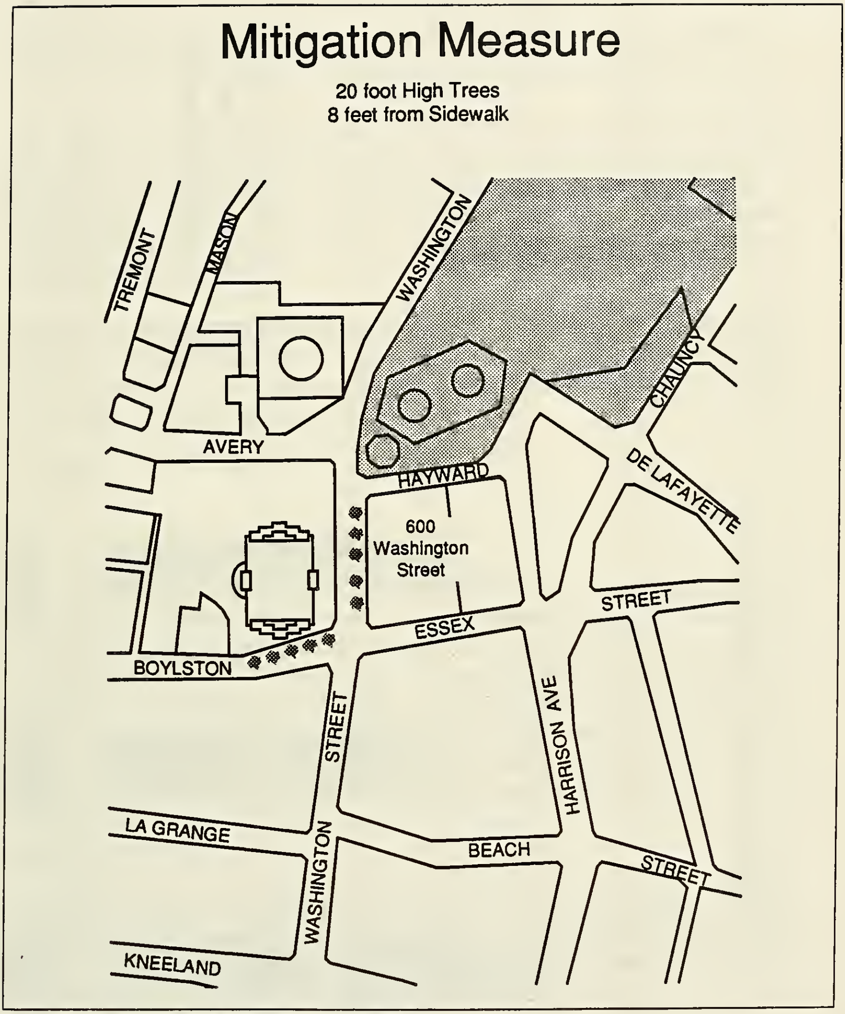

Figure 4. Wind Mitigation Measure - Tree Planting

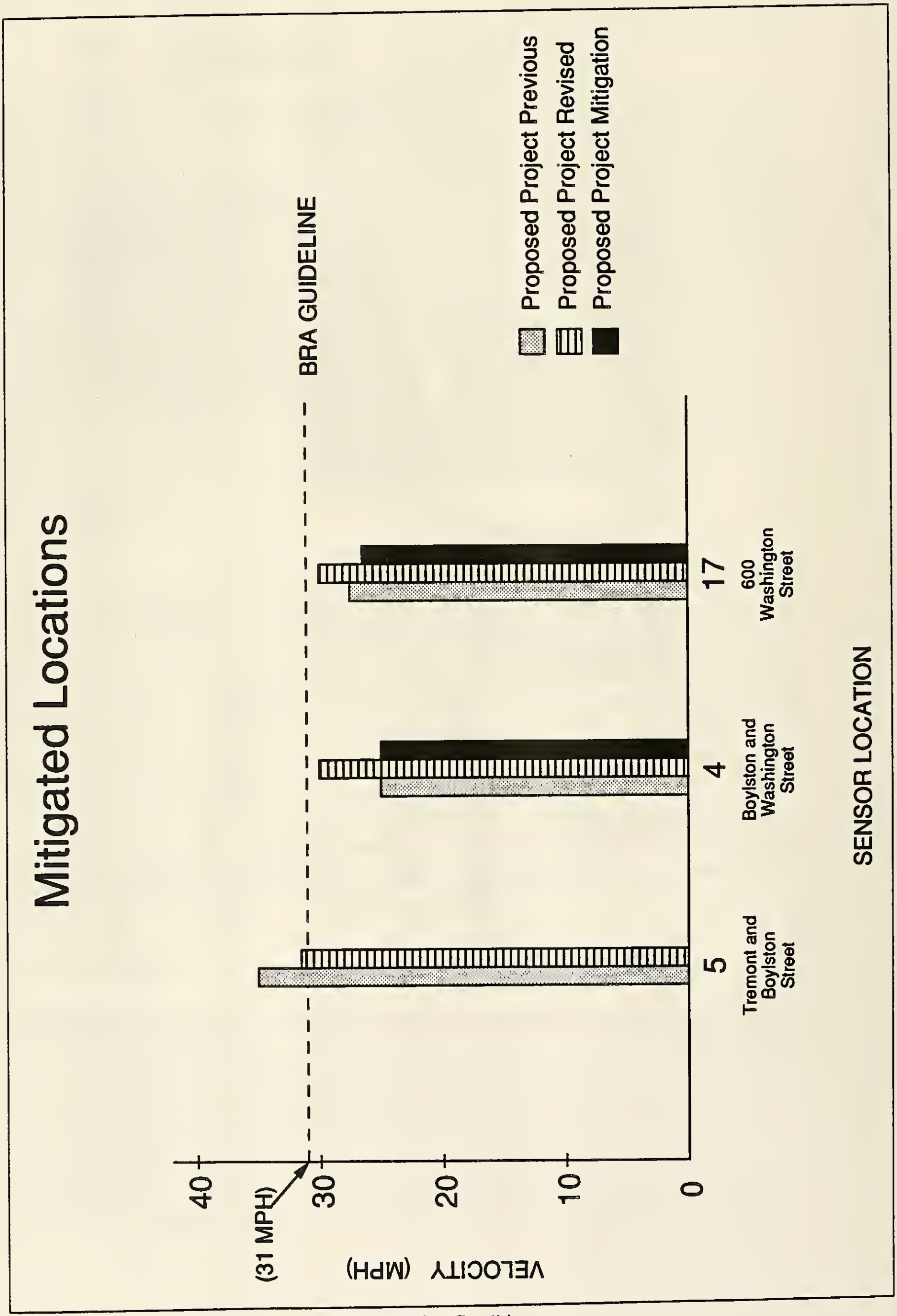

Figure 5. Effects of Tree Mitigations on Critical Wind Conditions

(30 feet high by 4 feet wide) attached to 600 Washington Street and positioned at one-third building length apart would also be an effective mitigation measure.

Due to the uncertainty of cooperation with the property owner of 600 Washington Street, and the historic nature of the building, the Project Proponent proposes to provide four trees in the location indicated conditioned to the cooperation of the building owner and the approval of the City of Boston. The Project Proponent will coordinate with the City for the planting of these trees, as well as others proposed along the project site.

No mitigation measures are possible to reduce velocities at sensor locations, 8, 33, and 34, as requested in the BRA's Preliminary Adequacy Determination. The local flowfield is dominated by strong winds deflected off Tremont-on-the-Common and are not a direct result of the Proposed Project.

C. Shadow

Impacts:

A series of computer-generated shadow analyses were performed in the DPIR/DEIR to predict and evaluate the extent of new project-generated shadows. In response to the BRA's comment, further shadow analyses were conducted in the FPIR/FEIR to test the conformance of the Commonwealth Center and Boston Crossing Projects to the zoning criteria established by the BRA, and incorporated into Article 38 of the Boston Zoning Code. This analysis indicates that the total area of net new shadow attributed to Commonwealth Center and Boston Crossing, together, is approximately .88 acres, or 38,000 square feet, which is in conformance with Article 38.

Mitigation:

Based on the revisions to the site and building design of both the Proposed Project and the Boston Crossing project, made subsequent to their respective DPIR/DEIR's, the net new shadow generated by both projects falls within the allowable guidelines established under Article 38 of the Boston Zoning Code.

Design revisions to the Proposed Project have included the total redesign and reorientation of the north tower on the Keith Block, and the lowering of the total height of the south tower on Parcel 30. No additional design revisions are proposed to either the height or massing of the Proposed Project.

D. Daylight

Impacts:

A daylight study was performed utilizing the Boston Redevelopment Authority's computer software. As reported in the DPIR/DEIR, results of this analysis indicate that in comparison to the Enhanced IPOD/Infill alternative, the Proposed Project actually allows the same or higher levels of daylight to penetrate the site at 6 of the 13 locations tested. This is due primarily to the fact that the tower elements of the Proposed Project are setback from the traditional streetwall base of the buildings. Locations which experienced increases in daylight obstruction levels are well within a range typical of the Boston Downtown.

In response to the BRA comments, additional information and clarification of certain observation points has been provided in the FPIR/FEIR. Points #10 and #13 have been reanalyzed with the revised north tower design, on the Keith Block. The analysis indicate that the new design configuration results in acceptable daylight obstruction percentages (see Technical Appendix).

Mitigation:

Based on the results of the daylight analysis presented in the DPIR/DEIR, and subsequent design revisions, the massing of the Proposed Projects results in an acceptable level of daylight penetrating the site to street level. Based upon the revised urban design configuration of the Proposed Project, no additional design revisions are proposed to either the height or massing of the buildings.

E. Air Quality

Impacts:

Results of the traffic-related air quality analysis performed in the DPIR/DEIR indicate that high traffic volumes and long vehicle queues produce CO values that approach the National Ambient Air Quality Standards (NAAQS) on the east side of Tremont Street. Through further refinement of the air quality model and appropriate adjustment to the trips generated by the Proposed Project, the intersection was analyzed for 1996 Build one and eight-hour conditions. The result of the analysis show compliance with the NAAQS. Therefore, the Project will not interfere with the Department of Protection's goal of attainment and maintenance of the NAAQS.

In response to the BRA comment, a mesoscale analysis of nonmethane hydrocarbons was prepared. The results of the analysis indicates that traffic generated by the Proposed Project makes an insignificant contribution to the regional burden of ozone on the major arterials of Boston.

Mitigation:

Based on the results of the air quality analyses for traffic and the underground garage performed in the DPIR/DEIR and amended in this report, no required mitigation is indicated. As part of the traffic mitigation measures identified in the overall transportation analysis, reductions to site specific carbon monoxide concentrations may occur in the vicinities of the intersections at Boylston and Tremont Streets, Essex Street and Harrison Avenue Extension, and at Essex and Lincoln/Surface Artery.

Changes proposed to the parking garage will maintain appropriate air handling equipment and monitoring measures to be consistent with the National Ambient Air Quality Standards.

F. Geotechnical

Impacts:

A geotechnical assessment, conducted in the DPIR/DEIR, indicates that construction of the below-grade parking levels will require a general excavation approximately 55 to 65 feet in depth within a major portion of the Parcel 30 area. The bottom of the excavation will be within or near the top of the glacial till, about 30 to 40 feet below groundwater.

As reported in the DPIR/DEIR, a reinforced concrete diaphragm wall (slurry wall) is planned at the perimeter of the deep basement to act as both the temporary earth support system and the permanent exterior basement wall. The wall will be extended a sufficient depth below the excavation level to provide an effective groundwater seepage cutoff both during construction and once the building is operational, provided an underdrain system is installed below the lowest level floor slab. The use of a perimeter slurry wall will minimize the need for dewatering and any potential decreases in groundwater level in the area, as well as provide a semi-rigid lateral earth support system to reduce the potential for inward movement of the wall which could cause ground movement outside the excavation.

For the structure support within the deep basement, foundations will be constructed inside the completed excavation, bearing directly on the subgrade soil or installed from the ground surface using non-displacement, low-vibration techniques. If used, end-bearing piles will be installed in preaugered holes to minimize vibration and heave.

In response to comments raised by the BRA, further information has been provided in the FPIR/FEIR relative to Boston Water and Sewer Commission requirements for a permit to temporarily discharge groundwater collected during the construction process into the City's storm drainage system, and to discharge groundwater into recharge wells around the site as a permanent method of de-watering.

Mitigation:

As presented in the DPIR/DEIR, the Proposed Project will employ construction of a slurry wall to minimize the need for dewatering and reduce the risk of potential decreases in groundwater levels in the area. The slurry wall will also reduce the potential for ground movements outside the excavation area.

In addition, the Project Proponent will specify construction performance criteria that will be imposed on the contractor or construction manager and careful monitoring of construction performance will be employed to mitigate adverse impacts on adjacent buildings, tunnels and utilities.

Based upon the results of a thorough soil boring and analysis conducted for the Project site, the Project Proponent proposes to apply for a permit for the temporary discharge of groundwater collected during the construction process into the City's storm drainage system. For permanent discharge of groundwater collected in the Project's underslab drainage system, the Project Proponent will explore the feasibility of pumping to recharge wells around the perimeter of the site.

G. Solid and Hazardous Wastes

Impacts:

Solid Waste

As reported in the DPIR/DEIR, the Proposed Project is anticipated to generate approximately 11,300 pounds of solid waste per day.

Hazardous Waste

A Chapter 21E Site Assessment ("Oil and Hazardous Material Site Evaluation") and a "Survey Report of Asbestos and PCB-Containing Materials" have been conducted since the DPIR/DEIR submittal to determine the probability of oil or hazardous materials being present on or beneath the ground surface of the site. Based upon these reports, the evidence collected suggests that contamination of the site with hazardous wastes is minimal. Both studies are currently available through the Boston Redevelopment Authority's library.

Detailed procedures for handling, testing and disposal of contaminated soil will be outlined in the project specifications and the Excavated Material Management Plan. These procedures will be implemented if contaminated soil is encountered during excavation.

Mitigation:

The Project Proponent will commit to collect and dispose of all solid waste through a private contractor to ensure high level sanitary conditions. Based on the analysis of solid wastes generated by the Proposed Project in the DPIR/DEIR, no further mitigation is indicated.

The Project Proponent proposes to provide an Excavated Material Management Plan to the DEP that will detail procedures for handling, testing and disposal of contaminated soil during the excavation process. These procedures will be implemented if contaminated soil is found during excavation.

H. Noise

Impacts:

In response to comments received by the BRA, the noise worksheets were checked and some adjustments made to the results of the noise analysis. The results of the analysis indicate increased traffic associated with the project will result in an imperceptible increase in noise levels at the eight locations analyzed (i.e., noise increase of 0-1 decibels).

In response to BRA comments, an analysis of the noise generated by the project's building equipment was conducted. Within the preliminary building equipment specifications assumed for the Schematic Design Phase of the Proposed Project, general equipment types and locations have been identified which will require some form of sound isolation; containment or alteration.

Mitigation:

Acoustical design treatments (e.g., slab construction, baffles, etc.) will ensure adjoining tenant space of a noise criteria of 40-50 which is typical of a multi-story building. Additionally, an acoustical engineer will be hired to identify noise problems and design architectural treatments to ensure that the building complies with all state and local codes regarding noise generation and transmission.

Implementation of traffic operation improvements by the Project Proponent as outlined in the transportation mitigation section of this report will also improve local noise conditions.

I. Construction

Impacts:

Project construction is estimated to begin in the Spring of 1990 and be completed by the end of 1996. The project will be executed in two phases with Phase I demolition and construction commencing in the Spring of 1990. Phase I completion is anticipated between 1992 and 1993. Phase II construction is estimated to begin in 1994 and be completed in 1996.

As described in the DPIR/DEIR, construction activity will generate temporary increases in area noise, traffic, dust and emission levels. However, it is anticipated that direct emissions from construction equipment will be insignificant. The main generator of noise during project construction will be trucking, which is a short-term and temporary condition. The number of workers on-site during the peak construction period is estimated to be 500, of which one-half are projected to be Boston residents, most using available public transit to and from the site.

In response to comments raised by the BRA on the construction chapter of the DPIR/ DEIR, an assessment of the cumulative impacts and proposed construction coordination between the Proposed Project and other construction projects in the area, has been provided in the FPIR/FEIR. In response to comments raised by EOEA, further information has been provided in the FPIR/FEIR relative to the amount and types of materials to be demolished including the method and location of disposal.

Mitigation:

The Project Proponent will supply a Construction Management Plan to the Boston Redevelopment Authority and the Boston Transportation Department as part of the required submission of a Transportation Management Plan. The following measures will be employed to reduce the effects of construction in the surrounding area:

- Possible use of implosion for the demolition of certain buildings in order to minimize the duration and overall noise level generated by conventional demolition.

- Inspection of all construction equipment to ensure that they are properly tuned and that noise mufflers are in place and in proper operating condition.

- Exposed dry surfaces will be wetted on a regular basis to minimize dust.
- Sidewalks and roadways will be cleaned of construction dirt on a regular basis.
- Location of aggregate storage piles away from Boylston, Tremont and Washington Street in order to minimize impact on areas of pedestrian activity.
- Use of covered delivery trucks in order to minimize spills.
- Possible use of tower cranes, in lieu of mobile cranes, in order to avoid impacts on local street operations.
- Scheduling of typical construction hours between 7:00 a.m. and 3:30 p.m. in order to minimize travel during peak commuting hours.
- Development of a full traffic maintenance plan to be coordinated with and approved by the Boston Traffic Department, Public Works Department and Fire Department.
- Assignment of police details commensurate with truck activity in or order to minimize impacts on normal automobile traffic and pedestrian patterns.
- Use of construction fence surrounding the site in order to partition such areas from pedestrian activity or surrounding land uses. Covered pedestrian bridges will be installed over sidewalks wherever dictated by overall construction activity.
- Proper disposal of all demolition/construction waste by licensed haulers, in accordance with all pertinent State and City regulations.

J. Rodent Control

Impacts:

In response to the BRA comments, details of a more frequent rodent control service program has been provided in the FPIR/FEIR.

Mitigation:

A rodent control program will be initiated prior to demolition of existing buildings on the site. The program, to be administered by a licensed pest control contractor, will include routine treatments for rodents in the basement and first two stories of all existing structures. Upper floors will be inspected and treated as needed.

The program will include weekly visits to inspect and treat rodents. Visits will continue to be made until such time as they demonstrate that semi-monthly visits are in order. For the duration of construction, inspections will be made twice a month, and will be increased if circumstances so dictate.

K. Urban Design

Impacts:

As described in the DPIR/DEIR, the existing Project site is situated in Boston's Midtown Cultural District proximate to the Boston Common, the Financial District, the Downtown Crossing retail district, Chinatown, Park Plaza and the "Adult Entertainment District". The Project site and the immediate surrounding area is currently characterized by many vacant buildings and surface parking lots. The existing buildings in the area exhibit a variety of architectural styles dating from various periods of the City's history.

Following the Preliminary Adequacy Determination issued from the Boston Redevelopment Authority, specific program reductions and design modifications have been made to reduce the effects on the urban environment generated by the Proposed Project and to enhance the public access to public areas within and surrounding the Proposed Project.

The Proposed Project, as revised, continues to reinforce the historic street pattern and streetwall heights, as well as the traditional scale of buildings elements, materials and fenestration at the pedestrian level. In addition, the northern office tower on the Keith Block has been entirely redesigned to:

- reduce the extent of shadow on the Boston Common,
- reduce the width of the tower face toward the Boston Common,
- reduce the size of the tower floor plates,
- increase the ratio of height to width, and
- increase the distance between the north and south towers.

A small reduction in distance has occurred between the north tower and the proposed tower on Hayward Place. This is due to the design and positioning of the north tower approximately 7 feet closer to Washington Street to achieve a maximum shadow reduction on the Boston Common. Additionally, refinements have been made to the top of the south tower on Parcel 30 to reduce shadow generated on the Boston Common, lowering the total height by approximately 20 feet. Collectively, the overall total above grade program area for both phases of the Project has been reduced by approximately 100,000 square feet.

Ground floor entries of the north and south towers have been refined and oriented to extend pedestrian activity along the major commercial streets. The hotel drop-off and entrance have been refined to provide greater pedestrian visibility, and to enhance access to interior public spaces. More direct pedestrian access has been provided to the MBTA Orange Line station, and sidewalk improvements are proposed to enhance the pedestrian environment. In addition, the creation of a landscaped, public park on the Keith Block and a major sidewalk widening at the Avery/Washington Street intersection will provide open space for area shoppers, tenants and residents.

A collaboration between an area artist and the Project architect has been initiated to enliven and animate special public areas within the Project. To meet the programmatic requirements of the Midtown Cultural District Zoning regulations, detailed plans of the daycare facility within the Proposed Project have been developed in conjunction with a qualified daycare consultant that meets the needs for infant, toddler and preschool care.

Mitigation:

Based on the urban design analysis of the Proposed Project as presented in the DPIR/ DEIR, enhancements to the urban design already include the following:

- Reinforcement of existing land use patterns within the Midtown Cultural District.

- Generous setbacks of the Project's taller massing elements minimizing adverse impacts on the Boston Common, the Washington Street corridor and historic buildings on, and adjacent to, the site.

- Provision of pedestrian through-block connections between Washington and Tremont Streets and Avery and Boylston Streets to reinforce the historic pattern of streets and alleyways.

- Improvements to the streetscape including stone sidewalk paving in and around the site, traditional scale sidewalk lighting, improved handicapped access to all public areas and clear and unobtrusive building graphics and signage.

- Reinforcement of important vistas down Washington Street from both the north and south by the presence of the Project's animated skyline.

Subsequent revisions made to the site and building design by the Project Proponent have responded to comments received from City and State agencies and public interest groups following the submission of the DPIR/DEIR. These revisions have resulted in the following mitigation measures:

- widening of the distance between towers,
- narrowing of the north tower elevation widths,
- smaller floor plates on the north tower,
- reduction in the south tower height,
- improved access to the Orange Line outbound station including provision for a location for the MBTA's handicapped elevator,
- proposed widening of sidewalks on Avery and Washington Streets, and
- provision of public open space on Avery Street.

The Project Proponent will continue to meet with the Boston Redevelopment Authority through the design and construction process to review and refine design details, materials and all design elements relevant to the public realm. The Project Proponent will commit to engage a local visual artist for a design collaboration involving specific areas of the Project's public spaces. In addition, the Project Proponent will continue to work with the appropriate State and City agencies to coordinate the design of transportation infrastructure and streetscape improvements on and around the Project site.

L. Historic Resources

Impacts:

Construction of the Proposed Project will involve the demolition of two non-historic buildings, one building categorized as Significant but which has been heavily altered, three buildings which have been categorized as Notable buildings which contribute to the character of the street but which are not individually significant, and the demolition and replacement of one building, the Evans House which has been petitioned for Boston Landmark status. The Project will retain and restore the Paramount Theater for theater use.

In response to comments received on the DPIR/DEIR, a feasibility study was undertaken that considered the rehabilitation and reuse potential of the Evans House. The study evaluated three alternatives. Due to the extent of the degradation of the structure and the primary facade on Tremont Street, the proponent's preferred alternative is to replace the existing building with new construction compatible with the scale and character of the Piano Row National Register Historic District. Design of this replacement building will be subject to the general standards and criteria of the Boston Landmarks Commission for an infill structure within this historic district, and the standards of the U.S. Secretary of the Interior.

Mitigation:

Through the site and building design of the Proposed Project, the Project Proponent has sought to mitigate the effects of large scale development within an area of historical and architectural importance. As indicated in both the Urban Design and Historic Resources sections of the DPIR/DEIR, the Proposed Project design provides for the following:

- The design of the Proposed Project maintains and enhances the late 19th and early 20th century streetwall pattern and texture by building out to the property line, varying the heights of the various components of the project, using a variety of building materials, and varying the pattern of the design at the sidewalk level.

- The design of the bulk of the building area in two towers greatly minimizes the effects of shadow on historic resources.

- New construction over the Paramount Theater has been designed in order to maintain the appearance of the Theater from Washington Street as a "free standing" building without construction above.

The Project Proponent is committed to providing the following mitigation measures:

- The Paramount Theater restoration/rehabilitation will be accomplished in accordance with the Boston Landmarks Commission Standards and Criteria and the Secretary of Interior's Standards for rehabilitation thereby minimizing any adverse effects that the restoration process may have on the original fabric of the building.

- The potential adverse effects of the new construction on historic resources will be mitigated through careful monitoring of the existing buildings within the construction impact area for the duration of the demolition, excavation,

> and new construction and through the installation of protective coverings at critical points of the on-site and adjacent buildings. Methods of demolition, excavation, shoring, and construction will be selected to minimize the vibration and potential impact damage to the greatest extent possible.

In addition, based upon the findings of the Evans House feasibility study, and discussion of these findings with the Boston Landmarks Commission, the Massachusetts Historical Commission and the Boston Preservation Alliance, the Project Proponent proposes to provide a new structure in place of the existing building. Three options, as detailed in Chapter IV, Letter 10, Comment #2 of this report, will be studied and presented to the design review committee of the Boston Landmarks Commission and the Massachusetts Historical Commission. Based on comments and recommendations from these groups, a preferred option will be presented to the Boston Landmarks Commission for design approval and incorporated into the Schematic Design Submission to the BRA.

M. Archaeology

Impacts:

As identified in the DPIR/DEIR, the project area's archaeological sensitivity was determined by an assessment of its potential integrity as well as by its potential significance. Due to the location of historic districts and individual properties within and in close proximity to the project, the site was determined to be potentially significant. With the varying degree of disturbance to the area's archaeological record, however, the site was stratified into zones of relative archaeological sensitivity.

The assessment identified four (4) areas as possessing a high degree of archaeological sensitivity. These areas are located within passageways and alleyways that records indicate as having remained relatively unaffected by the destructive processes that have occurred elsewhere in the project area. The four areas include the alley running east of Tremont Street, south of 174-175 Tremont Street and its north-south extension; the western half of the T-shaped termination of Avery Place; Mason Street Place; and Fayette Court.

Since submission of the DPIR/DEIR, the proponent has undertaken archaeological monitoring of the Evans House and has examined current utility maps pertaining to Avery Place, Mason Street Place and Fayette Court. Monitoring observations from the Evans House revealed a series of disturbances to the natural strata caused by the building of previously undocumented brick vaults, as well as utility lines and the construction of the Evans House itself. Similar evidence of site disturbances have been revealed by test pits and boring studies in all the previously identified areas

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Mitigation:

Based on the evidence of site disturbance in several of the previously identified ares of archeological sensitivity, the list of sensitive areas has been limited to Avery Place. The Project Proponent will conduct monitoring of test pits in this location prior to the construction on or immediately adjacent to this area. Based on findings from this monitoring program, additional archeological investigation may be indicated. Findings will be submitted to the Boston Landmarks Commission and the Massachusetts Historical Commission for determination of any subsequent action required for this location.

N. Infrastructure

Impacts:

Energy

As described in the DPIR/DEIR, the existing electrical and telecommunications systems have been found to have adequate capacity to serve the Proposed Project. Boston Gas has indicated that their existing system has sufficient capacity to service anticipated loads for Phase I of the Project. Providing service for the complete buildout of the Midtown Cultural District may require upgrades to some of the existing systems.

Water and Sewer Service

As described in the DPIR/DEIR, the demands on the region-wide water and sewer systems created by the Proposed Project are insignificant when compared to the overall operation levels of either system. In addition, the local systems have been found to have sufficient excess capacity to accommodate the Proposed Project as well as other developments within the area.

In response to comments received on the DPIR/DEIR, the Proponent has met with the Boston Water and Sewer Commission (BWSC) to discuss possible plans for storm and sanitary sewer system improvements. No improvements are necessary or planned at the current moment as part of the Proposed Project. The Proponent has, however, stated their intent to continue working with the BWSC to develop a sewer infrastructure improvement plan for the area.

Mitigation:

Energy

Upgrading of the various existing network systems to service new developments is common practice among privately held utilities. If such improvements are required in the future, as a result of increased demand, the private utilities would typically perform cost/benefit analyses based upon the needs of each development. If the analyses prove that the benefits gained (increased revenues and higher system efficiency) do not sufficiently balance the associated costs, a portion of these costs may be assigned to the project or projects that necessitate system improvements. The Project Proponent does not anticipate that major infrastructure improvements will necessitate this assignment of costs. However, to reduce the level of demand generated by the Proposed Project, the Project Proponent will provide:

- Insulation of wall areas with an average R value of approximately 13.

- Insulation of roof and exposed floor areas over unheated space will have an average R value of 17.

- Use of double glazed windows.

- Use of electric centrifugal machine at 0.60 to 0.73 KW/ton electrical input.

- Use of fan-powered "variable air volume" heating and cooling systems to provide local climate control in demand for exterior zones and variable volume system for all interior zones.

- Use of “variable inlet” controls for all primary air conditioning units in order to directly match local heating and cooling demands.

- Use of "variable inlet" controls for all primary air conditioning units in order to directly match local heating and cooling demands.

- Use of high-efficiency motors to drive all mechanical equipment.

- Design of lighting system which utilizes energy-efficient lamps and ballast.

- Insulation of all chilled water system components.

- Insulation of all hot water system components.

In addition, based on the cost/benefit analyses performed by the utility companies for upgrading existing networks to provide sufficient capacity for the Proposed Project, the Project Proponent will assume a fair portion of the upgrading costs allocated to new developments as deemed necessary. No further mitigation is proposed.

Water and Sewer

Based on the results of the analysis in the DPIR and DEIR and subsequent discussions with the Boston Water and Sewer Commission (BWSC), the Project Proponent will:

- Provide separate storm and sanitary sewers within the Project site,

- Install state approved water saving fixtures (sink faucets, shower heads, water closets), that will reduce water usage and sewage generation by an estimated 20-25 percent, commit to continue working with BWSC to develop a sewer infrastructure improvement plan for the area.

II. LETTER 1: BOSTON REDEVELOPMENT AUTHORITY PRELIMINARY ADEQUACY DETERMINATION ON DPIR/DEIR

OSTON
EDEVELOPMENT
JTHORITY

ymond L. Flynn
or

phen Coyle
ctor

City Hall Square
ton, MA 02201
) 722-4300

Letter #1

AUG 11 1989

CC
PROJ
DATE 8-1-89
CONFIR GSH

C.C. G.S.H. ✓
JACK KESSLER ✓ TLR
HWK ✓

ACTION:

TO FILE #: 3042. "BRA PRELIMINARY ADEQUACY DETERMINATION"

August 1, 1989

Mr. Alexander C. Twining
Commonwealth Center Limited Partnership
c/o F.D. Rich Company of Boston
99 Summer Street, Suite 1800
Boston, MA 02110-1200

William G. Constable, Esquire
Commonwealth Center Limited Partnership
c/o A.W. Perry, Inc.
Twenty Winthrop Square
Boston, MA 02110

Dear Messrs. Twining and Constable:

RE: COMMONWEALTH CENTER

This letter is the Preliminary Adequacy Determination (this "Determination") of the Boston Redevelopment Authority (the "BRA") with respect to the Draft Project Impact Report (the "DPIR") for your proposed Commonwealth Center project (the "Project"), which you submitted to the BRA on May 16, 1989.

The BRA is issuing this Determination pursuant to Section 31-5 of the Boston Zoning Code (the "Code"). This Determination requests information required by the BRA for its review of the Proposed Project in connection with the following:

a) Development Review pursuant to Article 31 of the Code;

b) Recommendations to the Board of Appeal with respect to the zoning relief required for the Proposed Project, pursuant to Articles 6, 6A, and 38 of the Code;

c) Approval of a Development Impact Project Plan, pursuant to Article 26A of the Code, and the entering of agreements for the Development Impact Project Contribution and Jobs Contribution Grant, pursuant to Articles 26A and 26B of the Code; and

d) Approval of a Development Plan pursuant to Section 38-10 of the Code in conformity with the procedures set forth in Sections 3-1A.a and 38-12 and the provisions of Sections 38-11 through 38-16.

PREAMBLE

The BRA is reviewing the Proposed Project pursuant to multiple sections of the Code. The Proposed Project is subject to BRA review and approval pursuant to Article 31 of the Code, Development Review Requirements, which sets out a comprehensive procedure for project review, and requires the BRA to review the design, transportation, environmental, and other impacts of proposed projects. Article 31 requires the submission of a satisfactory Final Project Impact Report ("FPIR") prior to the issuance of a building permit.

On May 2, 1988, the Proponent submitted to the BRA a Project Notification Form, for which the BRA responded with an Scoping Determination on June 1, 1988. As mentioned above, on May, 16, 1989, the Proponent submitted to the BRA a DPIR for the Proposed Project. This Determination is issued in response to the DPIR. On May 15, the BRA Board held a public hearing with regard to the Proposed Project, and on May 29, 1989, the BRA Board granted its approvals for this Proposed Project.

In addition, the Proposed Project requires zoning relief pursuant to Articles 6, 6A, and 38 of the Code. The substantive review requirements imparted by these sections address related, but not identical issues which are the basis of Article 31 review. The reviews, however, overlap to a significant degree. Therefore, the BRA is incorporating its review of zoning relief for the Proposed Project into the Article 31 process to eliminate regulatory duplication and consolidate the Proposed Project's review into one process and one set of documents.

The Proposed Project is located in an area in which Planned Development Areas (PDAs) are permitted within the Midtown Cultural District. Since the Proposed Project exceeds the as-of-right limits of Article 38, it will be reviewed pursuant to Sections 38-10 through 16 which establish procedures and requirements for PDAs. The DPIR is taken as an application for Development Plan approval. The FPIR must be prepared in accordance with Sections 38-10 through 16. This Adequacy Determination references certain requirements, applicable to projects for which Development Plan approval is required in the Midtown Cultural District, and therefore applicable to the Proposed Project.

I. THE MIDTOWN CULTURAL DISTRICT PLAN AND ARTICLE 38 OF THE CODE

On January 12, 1989, the BRA adopted the Midtown Cultural District Plan (the "Plan") as the portion of the general plan for the city governing the Midtown Cultural District. On March 6, 1989, the Boston Zoning Commission amended the Code to incorporate Article 38. Article 38 of the Code establishes the zoning regulations which are the legal framework for the realization of the Plan. Pursuant to Article 38, the Proposed Project is located within the Midtown Cultural District.

The Midtown Cultural District Plan was developed to guide the reemergence of Midtown Boston as a center of commerce, culture, and city life. The program that emerged from the community-based planning process calls for the creation of a mixed-use downtown community which will link the Back Bay and Financial District office markets and reconnect downtown's residential neighborhoods with each other and with the Boston Common and Public Garden.

The primary purposes of the new zoning plan are:

- To direct the Downtown economy in a way that promotes balanced growth for Boston, by preventing overdevelopment of the Financial District and Back Bay commercial areas;
- To revitalize Midtown as the region's center the performing arts, by creating new cultural facilities and rehabilitating existing theaters;
- To protect and provide for expansion of the thriving Chinatown neighborhood, by creating affordable housing, by controlling institutional expansion and by providing neighborhood business opportunities;
- To preserve the historic resources of the district by giving legal protection to more than 100 historic buildings; and
- To create a new residential neighborhood downtown.

Planned Development Areas

Article 38 establishes areas in which PDAs are permitted in order to encourage large-scale private development on underutilized sites, while insuring quality design through strict design guidelines and environmental impact standards. Developments within PDAs are required to provide benefits, such as cultural and community facilities, historic restoration, or affordable housing, so as to realize the goals of the Midtown Cultural District Plan.

Pursuant to Section 38-10 of the Code, the Proposed Project is located within an area in which the establishment of PDAs is permitted in the Midtown Cultural District. Specifically, the Proposed Project is located in PDA-II which has a maximum building height range of 155 to 400 feet and FARs of 10 to 14. The heights of the towers proposed are 403 and 400 feet and therefore are in substantial accord with the height provisions of Section 38-10. The FARs proposed are 12.34 and 12.07, both of which comply with the FAR provisions of Section 38-10.

Public Benefits in Planned Development Areas

Projects in PDAs must provide benefits sufficient to outweigh burdens in one or more of the following ways:

(a) the construction of a theater or other cultural facility;
(b) the rehabilitation of certain identified landmarks and theaters; or
(c) the provision of affordable housing.

Theaters or Cultural Facilities

The core of the Midtown Cultural District Plan is the creation of a new center for culture and performing arts. Boston's non-profit arts community and the Office of Arts and Humanities has developed a facilities plan to meet the needs of existing arts groups for affordable space. Accordingly, the Midtown Cultural District Plan calls for the creation of nine different performing arts facilities.

Through the adoption of a Resolution regarding the Proposed Project dated June 29, 1989, the BRA Board has resolved that the Proposed Project meets the objective of the Plan to create facilities, as noted above, in accordance with Section 38-14.1, Development Plan Approval for Development of a New Theater or Other Cultural Facility. Specifically, as a part of Development Plan approval, the Proponent has agreed to renovate the Paramount Theater into a 499-seat dance theater and a 199-seat theater. In addition, as a part of Development Plan approval, the Proponent has agreed to lease air-rights over a portion of the Keith Block tower along Mason Street for the potential development of additional cultural facilities.

Rehabilitation of Landmarks or Theaters

The Midtown Cultural District's large concentration of late 19th and early 20th century theaters is one of the best examples of an early theater district in the country. However, many of the district's most important historic buildings are in poor condition and need to be renovated.

Through the adoption of a Resolution regarding the Proposed Project, the BRA Board has resolved that the Proposed Project meets the historic preservation goals of the Plan in accordance with Section 38-14.2, Development Plan Approval for Substantial Rehabilitation of Existing Theaters, Historic Buildings and Landmarks. As previously mentioned, the Proponent has agreed to renovate the Paramount Theater into a 499-seat dance theater and a 199-seat theater. Because the Paramount Theater is a Boston Landmark, the restoration of this facility furthers the historic preservation goals of the District as well.

Housing and Jobs Linkage

The Midtown Cultural District Plan envisions the targeting of housing and jobs linkage monies from Midtown developments to benefit Chinatown. Such funds would be used by Chinatown community groups to design and build new housing in the neighborhood and to create approximately 1,000 job training slots.

Projected office developments in the Midtown Cultural District are expected to generate about $25 million in housing linkage funds. These funds will help finance the construction of 500 units of affordable housing in Chinatown and at least 150 units of affordable housing on the Hinge Block, which are projects included in the Chinatown Housing Initiative Program ("CHIP"). The CHIP addresses the neighborhood's overwhelming need for affordable housing. There are five parcels of land owned by the city on which the 500 units of housing will be built: Parcel R3/R3A, Parcel R-1, Parcel P-2, Parcels P-3, P-4, P-4A, and Parcel P-12.

The Proposed Project's housing linkage contribution will be used to further the housing goals of Chinatown as expressed in the Midtown Cultural District Plan. The Applicant has agreed to provide linkage assistance for the development of Parcels R3/R3A and C, through the Housing Creation process provided for in Article 26A of the Code.

The Midtown Cultural District Plan also includes programs and policies ensuring that members of the Chinatown community have access to the approximately 8,500 construction jobs and 15,000 permanent jobs which will be created in the district.

Since Chinatown is directly affected by major developments planned for the Midtown Cultural District, job training slots created by jobs linkage funds from Midtown developments will be made available to Chinatown residents. The Plan requires that developers create job training programs that will prepare Chinatown/South Cove residents for jobs at Midtown project sites.

The Proponent has agreed to work with the Neighborhood Jobs Trust in determining how the jobs linkage contribution for the Proposed Project will be used to further the objective of the Plan to train neighborhood residents for both the construction and permanent job opportunities created by Midtown development. Specifically, at this time the Proponent has proposed two programs to further the Midtown Cultural District policies: a child care training program and an English as a Second Language program. As previously stated, the Proponent has agreed to work with the Neighborhood Jobs Trust in further refining this jobs training package.

Daycare Facilities

The future economy of the Midtown Cultural District will depend, to a large extent, on the ability of its employers to attract and retain qualified workers, and the provision of daycare facilities is an important benefit for employees. Article 38 requires that a Proposed Project which is greater than one million square feet devote at least 12,000 square feet to day care facilities, either on-site or off-site, within the Midtown Cultural District, Bay Village, or Chinatown. However, at least 4000 square feet must be on-site.

While the proponent has substantially fulfilled this requirement in accordance with Section 38-18.4, specific additional material set forth below is required for submission in the FPIR.

Neighborhood Business Opportunities

Article 38 requires that an Applicant for a Proposed Project over 50,000 square feet use best efforts to market space within a Proposed Project to Neighborhood Business Establishments from Chinatown. Such best efforts must be detailed in a Neighborhood Business Opportunity Plan.

The proponent has committed to fulfill this requirement in accordance with Section 38-18.3, as outlined by the Development Impact Project Plan approved by the BRA June 29, 1989. Specifically, the Proponent will commission a retail market study for Asian businesses in the area and conduct small business workshops for Asian businesses in the Chinatown area. In addition, the Proponent will recruit Asian businesses to the Project.

General Design and Environmental Impact Standards in Planned Development Areas

Projects in PDAs must also adhere to certain design and environmental impact standards in addition to those set forth in Article 31 of the Code. These standards concern shadow and wind impacts, transportation access, the skyline, landmarks and historic buildings, and the pedestrian environment.

Specific additional material necessary to show compliance with these provisions of the Plan are set forth in this Determination.

II. BOYLSTON ESSEX URBAN RENEWAL PLAN

A portion of the Proposed Project site lies within the Boylston-Essex Urban Renewal Area. Minor modifications to the Urban Renewal Plan have been proposed by the Proponent and were approved by the BRA on June 29, 1989.

III. DEVELOPMENT REVIEW REQUIREMENTS - ARTICLE 31

Article 31 of the Code institutes a process by which large-scale development projects will be reviewed by the BRA. In its review of the DPIR, the BRA has identified certain components which are insufficient and which you must modify, and additional information which the BRA requires in order to issue an Adequacy Determination. The following is a description of the sufficiency of the materials submitted in the DPIR, and the additional materials which you must include in the FPIR.

The following are the BRA's specific comments in reference to the DPIR.

I. TRANSPORTATION COMPONENT

Each of the elements submitted in the DPIR is sufficient to satisfy the scoping requirements, but for the following information which must be included in the FPIR:

A. Traffic Management Element

1 1. The trip distribution assumptions need to be revised. They assign all trips having origins or destinations in the north and west to Tremont and Boylston Streets, respectively. It is likely that a significant portion of these trips will use the Central Artery and Kneeland Street. Further, vehicles going to and from the west would be likely to use the Massachusetts Turnpike via Chinatown. Analysis in the FPIR should redistribute vehicles based on these assumptions of trip

distribution dictated by the local and regional roadway network.

2 2. The Scoping Determination required the analysis of ten intersections which a preliminary examination indicated would be most likely to be affected by project-generated traffic. Upon review of the DPIR and other information, it appears that two additional intersections not included in the Scoping Determination would also experience significant increases in traffic volumes. Therefore, the following intersections should be analyzed in the FPIR for the existing, build, and no-build conditions:

a. Kneeland Street/Surface Artery

b. Church Green (Lincoln Street/Summer Street/Bedford Street)

Analysis of these intersections should incorporate new trip distribution assumptions, as described above.

3 In addition, the FPIR should include an analysis of the Proposed Project's incremental impact on the regional traffic network as requested in a comment letter received by the BRA. Included in this analysis must be a discussion of the Proposed Project's impacts on representative segments arterials such as Storrow Drive, the Southeast Expressway, the Central Artery, and Route 1. The precise segments should be determined in consultation with staff of the BRA and Boston Transportation Department.

4 3. Due to the proximity in phasing and distance between the Proposed Project and the proposed Boston Crossing project, it is important that the BRA and the Boston Transportation Department understand in the fullest manner possible the joint impact of these projects. To achieve this level understanding, the FPIR should outline the differences in method and assumptions in the formulation of the Transportation Access Plans for your Project and the Boston Crossing Project. An explanation of how each of these differences led to differences in level of service for common intersection is required in the FPIR.

5 4. The FPIR must include an area-wide origin and destination study of pedestrian traffic in the site area, including volumes and "desire-lines" for access through, within, and around the site, as required in

the Scoping Determination. Analysis for this section of the FPIR must clearly indicate hours during each day during which internal circulation routes are open or closed to the public.

5. The FPIR must include a pedestrian demand and capacity
analysis on project area sidewalks, as required in the
Scoping Determination. The FPIR must show the required
6 and actual depth of reservoir space for the
intersections analyzed, as discussed in Pushkarew and
Zupan (MIT Press, 1975). In addition, mitigation
measures which address degradations in pedestrian
7 levels of service must be more thoroughly explored in
the FPIR and will later be included as part of the
Transportation Access Plan Agreement for the Proposed
Project.

6. The FPIR must include plans which clearly show
8 pedestrian connections to existing and planned public
transportation stops, as required in the Scoping
Determination.

7. The FPIR must include circulation patterns for
9 pedestrians and vehicles by destination, as required in
the Scoping Determination.

8. The FPIR must include information regarding operation
of the drop-off and pick-up area of the hotel.
10 Additional detail is required regarding the dimensions
of this porte-cochere, including the length and width
of the vehicle way and pedestrianway, and the ability
of the current design to handle vehicular and
pedestrian demands. Special information regarding the
11 operation of taxi drop-off and pick-up must be included
in the FPIR, as required by the Scoping Determination.
Methods of operation for taxi service to and from the
12 Proposed Project's site must be described in the FPIR.

9. The FPIR must include analysis of proposed loading areas, as required in the Scoping Determination. Information required includes:

13 a. Anticipated delivery volume and schedule;

b. Number, location and dimension of docks; and

c. Size and maneuvering space on-site or in public rights-of-way.

B. Parking Management Element

14 1. The method of deriving parking demand is not based on the vehicle-trip generation analysis presented earlier in the report and does not distinguish between demand resulting from work and non-work trips. The parking section of the FPIR must provide more detail with regard to the proposed number of spaces designated for each use in the project, and the phasing of the construction and use of these spaces relative to the rest of the Project. 15 Specifically, the FPIR should provide the basis for the need for these spaces based upon the following: (1) the use by purpose of existing space on the site; (2) a use-by-use breakdown of the projected parking demand; (3) a comparison of the number of spaces in other recently constructed downtown projects; (4) the proximity of the Proposed Project to mass transit; and (5) other factors which could affect the need for parking to serve the Proposed Project.

C. Construction Management Element

The description of the proposed construction mitigation measures in the DPIR is sufficient to satisfy the scoping requirements. A prerequisite to the issuance of a building permit is the execution of a Construction Management Agreement by the proponent and the Boston Transportation Department.

D. Monitoring Element

The monitoring program described in the DPIR is sufficient to satisfy the scoping requirements.

Except for the above requirements, the Transportation Component of the DPIR is sufficient to satisfy the scoping requirements.

II. ENVIRONMENTAL PROTECTION COMPONENT

The analysis of impacts for each of the elements of the environmental protection component submitted in the DPIR is sufficient to satisfy the scoping requirements, but for the following information which must be included in the FPIR:

A. Wind

16 1. A wind analysis should include maps indicating sensor locations and wind speed data, graphically indicating changes in wind speeds caused by the Proposed Project,

as required in the Scoping Determination.

17 2. A seasonal analysis of wind impact must be included in the FPIR, as required in the Scoping Determination.

18 3. A comparison of sensor points which were tested for both the Commonwealth Center and Boston Crossing projects in the DPIRs indicates significant differences in the results, where generally the Commonwealth Center speeds are 5-7 mph lower than Boston Crossing's. This discrepancy must be explained in the FPIR, especially since the two models were the substantially the same, with the exception of the configuration of the tower at Summer and Chauncy Streets, which should not have significantly affected the subject stations.

19 4. At four locations, the Proposed Project would result in exceedances of BRA wind standards, all four of which happen to be exceeded in the 1996 No-build condition as well. However, in two locations (sensor points #5 and #8) the Project further exacerbates these exceedances. Mitigation measures to reduce wind levels at these four locations to acceptable conditions must be proposed and tested, and the results must be included in the FPIR.

B. Shadow

20 1. The Proposed Project's and the Boston Crossing project's joint conformance with the shadow criteria of Article 38 must be demonstrated in the FPIR.

C. Daylight

21 1. Several of the analysis views do not correspond with the facade sketches. This must be clarified in the FPIR.

22 2. In Figure 89, observation points 6,11, and 12 are not identified; there are two points labeled "4" and two labeled "9," and at the "4/10" location it is unclear which is 4 and which is 10. This must be clarified in the FPIR.

23 3. The FPIR must clarify Figure 89. Namely, if 80 Mason Street remains unchanged, and point 4 represents a view of 80 Mason Street, the FPIR must explain why the views for point 4 in Figures 109 and 110 change. The FPIR must explain the same for point 7, which presumably represents a view of the Masonic Building.

24 4. Within the appendix, the "Project Data" sheets show a point 6a and a point 6b for the IPOD/Infill scheme. The FPIR must explain where these points are located.

D. Air Quality

25 1. Differences between the results of the air quality analyses found in Commonwealth Center's and Boston Crossing's DPIRs should be explained. Specifically, where the Commonwealth Center analysis found no exceedances of standards for either the existing or the future condition, the Boston Crossing analysis found several exceedances of the eight-hour standard. Considering the poor levels of service found at several intersections, the low CO levels found in the Commonwealth Center analysis may be questionable.

26 2. The Department of Environmental Quality Engineering's monitor at Washington and Essex Streets has consistently shown high CO levels and in the past has recorded several exceedances of the eight-hour standard. The significantly lower levels predicted by the air quality analysis for this intersection are inconsistent with these findings. This must be explained in the FPIR.

27 3. The FPIR must explain why the worst case wind direction generally changes at each receptor location for the different analysis years.

28 4. As a mitigation measure to reduce potential exceedances at Park and Tremont Streets, retiming of the signal phasing to lengthen time for vehicular movements is proposed. However, this intersection is a major pedestrian crossing, and reducing the time allowed for pedestrian circulation may seriously affect the pedestrian level of service at this intersection. Impacts of this mitigation measure on pedestrian levels of service at this intersection must be studied in the FPIR. If these impacts proves significant, other mitigation measures must be proposed and tested in the FPIR.

29 5. The FPIR must include discussion of the Proposed Project's impacts to tropospheric (ground-level) ozone on a regional scale, as requested in a comment letter received by the BRA from the Conservation Law Foundation, dated June 15, 1989.

E. Geotechnical Impact

30 1. The discharge of groundwater or porewater in the City's storm drainage system will require a permit from the Boston Water and Sewer Commission. The FPIR should include the requirements of the Commission for this permit.

F. Solid and Hazardous Waste

31 1. A copy of the Chapter 21E site assessment report, as well as the report on the presence of asbestos and PCBs, must be filed in the FPIR.

G. Noise

32 1. The FPIR must explain why the day/night noise level ("DNL") from auto at the Boston Common is less in the future year (1996) cases than for existing (1989) conditions, especially since traffic in 1996 will be significantly greater.

33 2. An analysis of the noise impact from the Project's building mechanical equipment must be included in the FPIR, as required in the Scoping Determination.

34 3. In Table 35, the cumulative DNL for Tremont on the Common is incorrect. The FPIR must include correct information.

35 4. Only half of the analysis worksheets were included in the Appendix. Worksheets for the remaining intersections must be included in the FPIR. In addition, the worksheets contain several errors:

36 a. Boston Common/Existing: Auto and heavy truck DNL should be reversed.

b. Hotel Entrance/Existing: Heavy truck DNL should be 60, not 55.

c. Hotel Entrance/No-Build 1996: Auto and heavy truck DNL should be reversed.

37 These errors must be corrected in the FPIR, and the cumulative DNL totals for these receptor locations must be corrected, and Tables 35 and 36 must be revised accordingly. If these revisions affect the analysis submitted in the DPIR, the analysis must be re-

38 submitted in the FPIR. The worksheets submitted in the

FPIR should be examined for errors and corrected, if necessary.

H. Construction Impact

39 1. An assessment of the cumulative impacts of the Proposed Project and other construction projects occurring in the area during the same time frame (e.g. Boston Crossing), and proposals for coordination among various projects, must be included in the FPIR.

I. Rodent Control

40 1. Rodent control service is only scheduled for once a month, according to the Program Specifications. More frequent service obviously will be needed during the construction of the Proposed Project. A revised frequency of service must be included in the FPIR.

III. URBAN DESIGN COMPONENT

The materials submitted in the Urban Design Component of the DPIR are sufficient to satisfy the scoping requirements, but for the following studies which must be included in the FPIR:

A. Massing

41 1. The FPIR must include analysis of an alternative schematic design for the north tower that minimizes the impact of new shadow on the Boston Common and reduces the width of the building as seen from the Common. The average floor plate area should be decreased, and the ratio of height to width increased, to accomplish this objective. An alternative for the north tower which measures 400 feet in height could be explored.

42 2. The distance between the north and south towers and the distance to the proposed tower at Hayward Place must be increased in the alternative presented in the FPIR. These objectives could be met through the proposal of a taller, slimmer design for the north tower.

43 3. Refinements of the rooftop and massing details of both towers must be investigated in the FPIR.

B. Streetscape

1. The alternative explored in the FPIR must enhance the potential for activity on Avery Street by relocating or

44 adding an entrance to the north tower along this street, increasing the prominence and attractiveness of the hotel drop-off and entrance, and providing access to stores.

45 2. A design alternative which provides direct access for all persons from the Proposed Project's internal pedestrian ways to the outbound track of the MBTA Orange Line Chinatown station must be explored in the FPIR.

46 3. The FPIR must include an analysis which explores opportunities for widening sidewalks on Boylston, Washington, and Avery Streets.

C. Facades and Interior Public Spaces

47 1. The FPIR must include drawings and renderings of exterior facades and interior public spaces of the north tower, hotel, gallery, and south tower elements showing materials and details.

48 2. Evidence of the establishment of a program to engage artists in collaboration with architects must be provided in the FPIR. The goal of the collaboration would be the creation of lively, interesting, and unique public areas.

49 3. The FPIR must include detailed floor plans of the daycare facility, and other materials as needed, to demonstrate the ability of a day care provider to operate the facility in conformance with all regulations of the Office for Children.

D. Open Space

50 1. The FPIR must include studies illustrating options for outdoor public open space on Washington Street at the proposed hotel and elsewhere on the site.

51 2. The FPIR must include materials which illustrate options for public use of rooftop space throughout the project, including plans and other materials which show the possible use of roof space as outdoor play space required for the day care facilty. The FPIR must demonstrate how such outdoor play space conforms with all applicable regulations of the Office for Children.

IV. HISTORIC RESOURCES COMPONENT

The materials submitted in the Historic Resources Component of the DPIR are sufficient to satisfy the scoping requirements, but for the following studies which must be included in the FPIR:

52 1. The FPIR must include a feasibility study of retaining the existing interior floor system and structure of the Evans House. This study should demonstrate the proponent's ability to incorporate this existing floor system and structure into the rest of the project.

53 2. As required in the Urban Design Component above, subject to the existence of documentation, the FPIR must provide alternative designs for the lower floors of the Evans House that restore the original character. In the absence of such documentation, the design of these lower floors should evoke traditional storefronts of the period.

54 3. The alternative north tower design (see III., A., 1.) should have minimal visual impact on the restored facade of the Paramount Theater.

4. The following technical corrections must be included in the FPIR:

   55 a. The DPIR states, "the Evans House has been rated as a Category III, Notable, building." In fact, Category III buildings are considered "Significant."

   56 b. The DPIR fails to identify the Boston Common, Public Garden, Boylston Building, and Young Men's Christian Union ("YMCU") as Boston Landmarks. The FPIR must do so. In addition, the YMCU should be added to the section entitled, "Boston Landmarks Adjacent to the Site."

   57 c. Figure 176, entitled "Designated and Pending Landmarks Affected by the Proposed Project," includes the Oliver Ditson Building. This building should not be highlighted in this figure.

   58 d. It should be noted in the section entitled "Boston Landmarks Remote From the Site" that the both the Savory/Keith Memorial Theater and Filene's have been petitioned for Boston Landmark status.

V. INFRASTRUCTURE SYSTEMS COMPONENT

The analysis of the Proposed Project's impact on infrastructure systems submitted in the DPIR is sufficient to satisfy the scoping requirements, but for the following information, the submission of which is required in the FPIR:

59 1. The infrastructure analysis does not state whether any utilities or systems require relocation or termination due to construction over old alleys or under Avery Street. This must be clarified in the FPIR.

60 2. The infrastructure analysis in the FPIR must address fire service connections in greater detail. The Boston Crossing project, for example, describes the existing HPFS system in the abutting streets.

61 3. More extensive efforts to conserve water and energy should be discussed. The water conservation program developed with MWRA must be reported in the FPIR.

62 4. Extensive cooperation with adjacent projects such as Parkside and Boston Crossing would benefit the project and the analysis and discussion of this must be included in the FPIR. Construction of improved infrastructure systems should be coordinated with construction impacts generally but specifically with the aim of potential cost sharing. The Boston Crossing project intends to alter some utility lines; this interface must be taken into account in the project discussion in the FPIR. For example, the separated sewer system in Avenue de Lafayette is discussed in the DPIR, but this system will be completely rerouted under the Boston Crossing proposal.

63 5. Sewer systems used in abutting streets and primary connections should be upgraded to separate storm and sanitary systems. Discussion of how this will be accomplished must be included in the FPIR.

64 6. More information about the potential network expansion by Boston Gas is required in the FPIR.

VI. AGREEMENTS

The following must be provided in form and content satisfactory to the appropriate signatory public agencies before the Project can receive final approval by the BRA. They are not required for the FPIR.

1. Transportation Access Plan Agreement
2. Traffic Maintenance Plan in conformity with the City's Construction Management Program
3. Development Impact Project Agreement pursuant to Articles 26A and 26B of the Code
4. Cooperation Agreement pursuant to Section 3-1A.a of the Code
5. Land Disposition Agreement
6. Cultural Facilities Agreement pursuant to Article 38 of the Code
7. Memorandum of Understanding with Chinatown regarding Housing Creation and Job Training
8. Memorandum of Understanding with Action for Boston Community Development regarding Job Training
9. Boston Residents Construction Employment Plan, pursuant to Chapter 12 of the Ordinances of 1986 of the City of Boston, as amended by Chapter 17 of said Ordinances, and Executive Order Extending Boston Residents Job Policy, signed by the Mayor on July 12, 1985

But for the required corrections, clarifications, and additional information described above, the DPIR submitted is sufficient to satisfy the scoping requirements.

We look forward to reviewing the FPIR.

Sincerely,

Stephen Coyle
Director

LETTER 1: BOSTON REDEVELOPMENT AUTHORITY PRELIMINARY ADEQUACY DETERMINATION ON DPIR/DEIR

Clarification of comments received in the Preliminary Adequacy Determination appears in Appendix A - BRA Documents.

Comment #1:

Topic: Transportation

Comment: Revise trip distribution assumptions

Response:

The assumed trip distribution within the DPIR/DEIR assigned all site-related traffic to/from the West to Boylston Street during both peak hours, and assigned all site-related traffic from the North during the AM peak hour to Tremont Street southbound. All northbound departing trips were assigned to Essex Street eastbound to the Central Artery northbound during both peak hours. In order to test the validity of the DPIR/DEIR trip distribution assumptions, a series of timed travel runs during weekday morning and afternoon peak hours were conducted by Sasaki Associates, Inc. on Monday, September 11 through Wednesday, September 13, 1989.

To first test the validity of the assumption that all traffic from the West destined for the site will access via Boylston Street eastbound, multiple timed travel runs to the site were conducted during the AM peak hour on the following access routes:

A) the Copley Square exit of the Massachusetts Turnpike to Dartmouth Street northbound, to Boylston Street eastbound to the site;

B) the Copley Square exit of the Turnpike to Stuart Street eastbound, to Charles Street South northbound, to Boylston Street eastbound to the site; and

C) the Massachusetts Turnpike eastbound to the South Station/Kneeland Street exit, Kneeland Street westbound to Washington Street northbound, to West Street westbound to Tremont Street southbound, to Boylston Street eastbound to the site.

It should be noted that one-way westbound West Street was employed within these timed travel runs to represent and approximate assumed future conditions in which Avery Street will be within one-way operation westbound.

Table 3 presents the results of the above timed travel runs in average distances and average total times of each above route from the West.

Table 3: Results of Timed Travel Runs From the West, AM Peak Hour

Access Route	Average Distance	Average time to Traverse Route
A	1.1 mile	5 minutes, 20 seconds
B	1.1 mile	6 minutes, 41 seconds
C	2.5 miles	7 minutes, 26 seconds

As displayed in Table 3, access routes from the West during the AM peak hour are most time and distance-efficient via a routing which employs Boylston Street eastbound to the site. This assignment assumption would include trips destined to the site via Commonwealth Avenue and Storrow Drive eastbound, as well as from the Turnpike. Thus the DPIR/DEIR's distribution and assignment for access trips from the West during the AM peak hour are validated and remain unchanged in the FPIR/FEIR.

Similar timed travel runs were conducted during the PM peak hour for departing access trips designed for locations to the West. The routes of the runs were as follows:

A) Boylston Street and Essex Street eastbound from the site to the Surface Artery southbound, to the Kneeland Street on-ramp of the Massachusetts Turnpike as far as the Marginal Street on-ramp of the Turnpike; and

B) Boylston Street eastbound from the site to Washington Street northbound to West Street to Tremont Street southbound, to Marginal Street eastbound to the Marginal Street on-ramp of the Massachusetts Turnpike.

Table 4 presents the comparative times and distances of the above westbound departing trip routes.

Table 4: Results of Timed Travel Runs to the West, PMPeak Hour

Access Route	Average Distance	Average Time to Traverse Route
A	1.5 miles	4 minutes, 56 seconds
B	1.9 miles	8 minutes, 0 seconds

As Table 4 presents, the route to the West from the site for those trips destined to the Massachusetts Turnpike is more time and distance-efficient via a routing which employs Essex Street eastbound to the Surface Artery and the Kneeland Street on-ramp of the Turnpike. Other site-related trips destined to the West via Storrow Drive, Beacon Street or Commonwealth Avenue (estimated to be about 50 percent of total PM peak hour westbound trips) are assumed to employ the DPIR/DEIR assignment of Boylston Street westbound from the site via Washington Street and Avery Street to Tremont Street. For the purposes of the FPIR/FEIR, peak hour trips from the West employ the same assigned route as reflected in the DPIR/DEIR. Peak hour trips to the West employ a split assignment of 50 percent of departing trips to the Surface Artery via Essex street eastbound, and 50 percent to Boylston Street westbound according to the assignment reflected in the DPIR/DEIR.

To test the validity of the DPIR/DEIR trip distribution assumptions and assignment of AM peak hour trips from the North, which assume an access route via Tremont Street southbound, multiple timed travel runs were conducted by Sasaki on the following routes:

A) the Government Center exit of the Southeast Expressway southbound to New Chardon Street to Cambridge Street and Tremont Street to the site at Boylston Street; and

B) the South Station exit of the Southeast Expressway southbound to Bedford Street, Avenue de Lafayette, Washington Street, West Street, to Tremont Street and Boylston Street to the site.

Table 5 presents the results of those timed travel runs in average distances and times to traverse the routes.

Table 5: Results of Timed Travel Runs From the North, AM Peak Hour

Access Route	Average Distance	Average Time to Traverse Route
A	1.0 miles	5 minutes, 45 seconds
B	1.6 miles	8 minutes, 10 seconds

As Table 5 presents, the routing which assigns AM peak hour traffic from the North to Cambridge Street and Tremont Street southbound, as represented in the DPIR/DEIR, is more time and distance-efficient than an alternative routing from the South Station area. Therefore, the FPIR/FEIR analyses reflect no alteration to the previously assumed distribution and assignment for trips from the North in the DPIR/DEIR. As noted previously, the assigned route within the DPIR/DEIR for trips to the North from the site entails Essex Street eastbound to the Central Artery northbound, and no alteration to this assignment is reflected in the FPIR/FEIR.

Furthermore, the trip assignment to/from the South has been further defined to reflect the following revisions from that represented in the DPIR/DEIR:

1) Trips to the site from the South are equally assigned to northbound Washington Street; Kneeland Street westbound from the Central Artery northbound to Washington Street northbound; and Lincoln Street northbound from the northbound Central Artery to Essex Street westbound.

2) Trips from the site to the South are assigned in a manner which routes 66 percent of departing trips to Essex Street eastbound to the southbound Surface Artery and Central Artery on-ramp, and 34 percent to Washington Street northbound from the site to Avery Street westbound to southbound Tremont Street.

The peak hour traffic volumes at Study Area intersections which result from this redistribution are presented in Figures 6 through 9. Re-analyses of all Study Area intersections at Build vehicle volume levels to reflect the revised distribution and assignment of site-related vehicle trips are included within the response to Comment #2 below.

Comment #2:

Topic: Transportation

Comment: Analyze the following two additional intersections for the existing, Build, and No-Build conditions:

- Kneeland Street/Surface Artery
- Church Green (Lincoln Street/Summer Street/Bedford Street)

Response:

The traffic impact analysis Study Area has been expanded to include the Kneeland Street/Surface Artery intersection, and the Church Green intersection (Lincoln Street/Summer Street/Bedford Street). Peak hour vehicle volumes for these intersections have been provided by Howard/Stein-Hudson Associates, Inc., and represent existing volumes as reflected in the DEIR for the One Lincoln Street Development (EOEA #6132, May 30, 1989). Capacity analyses have been conducted for these two intersections in accordance with the guidelines of the Transportation Research Board (Highway Capacity Manual, 1985) for signalized intersections. The resulting capacity analyses are presented in terms of Level of Service (LOS) and average vehicle delays.

Level of Service, an expression of the quality of traffic operating conditions, is designated in a range from "A" (providing for free flow and little or no traffic delay), to "F" (involving extensive average delays often resulting in lengthy vehicle queues). Level "B" is still within the range of stable vehicle flow, but driver comfort and convenience is somewhat less than in Level "A" due to higher vehicle volumes. Level "C" involves a further reduction of comfort and convenience due to increased interaction among vehicles in the traffic stream. Level "D" represents high-density yet stable vehicle flow, with generally poor driver comfort and convenience. Small volume increases may often cause operational problems at Level "D" , and this Level is generally considered the lower limit of acceptable conditions within urbanized areas such as Metropolitan Boston. Level "E" represents operating conditions at or near the practical capacity of the roadway facility. Driver comfort and convenience are extremely poor, and frustration is high. Traffic flows are usually unstable, and small volume increases or blockages in flow will result in breakdowns. Level "F" represents facility breakdown, or gridlock, and results when traffic volumes exceed the amount which can be reasonably handled by a facility. Queues with stop-and-go waves are common, with extremely unstable flows.

Table 6 presents the results of capacity analyses for the expanded Study Area intersections within existing operating conditions.

Table 6: Capacity Analyses/Existing Conditions (1988)

	AM Peak Hour		PM Peak Hour	
Signalized Intersection	Average Vehicle Delay in Seconds	LOS	Average Vehicle Delay in Seconds	LOS
Boylston Street/ Charles Street	13.0	B	12.5	B
Boylston Street/ Tremont Street	15.8	C	18.8	C
Boylston Street/ Washington Street/ Essex Street	10.0	B	13.3	B
Stuart Street/ Tremont Street	8.7	B	12.4	B
Stuart Street/ Washington Street/ Kneeland Street	7.4	B	8.1	B

	AM Peak Hour		PM Peak Hour	
Signalized Intersection	Average Vehicle Delay in Seconds	LOS	Average Vehicle Delay in Seconds	LOS
Essex Street/ Surface Artery/ Lincoln Street	24.3	C/D	30.4	D
Tremont Street/ Park Street	6.2	B	8.1	B
Tremont Street/ Avery Street	3.8	A	4.4	A
Washington Street/ Avery Street	6.1	B	10.1	B
Kneeland Street/ Surface Artery	8.6	B	13.9	B
Lincoln Street/ Summer Street/ Bedford Street	10.0	B	11.7	B

	AM Peak Hour				PM Peak Hour			
Unsignalized Intersection	Vol.	Cap.	Res. Cap.	LOS	Vol.	Cap.	Res. Cap.	LOS
Essex Street/ Harrison Ave. Extension								
- Harrison LT	53	335	282	C	228	222	6	F
- Harrison TH	53	390	337	B	253	266	13	E

As Table 6 displays, the expanded Study Area intersections of Kneeland Street/ Surface Artery, and Lincoln Street/Summer Street/Bedford Street both presently operate at Level of Service "B" in both the AM and PM peak hours. Otherwise, Study Area intersection peak hour operations in Table 4 are as presented in the DPIR/DEIR, with the exception of the intersection of Boylston Street/Washington Street/ Essex Street, which has been re-analyzed to include an all-pedestrian phase of 14 seconds in length within its signal phasing. No alteration to existing peak hour levels of service of "B" result from this phasing addition..

Table 7 displays the No-Build capacity analyses for the expanded Study Area, inclusive of the intersections of Kneeland Street/Surface Artery, and Lincoln Street/ Summer Street/Bedford Street at Year 1996.

Table 7: Capacity Analyses/No-Build Conditions (1996)

	AM Peak Hour		PM Peak Hour	
Signalized Intersection	Average Vehicle Delay in Seconds	LOS	Average Vehicle Delay in Seconds	LOS
Boylston Street/ Charles Street	13.5	B	16.5	C
Boylston Street/ Tremont Street	17.4	C	37.4	D
Boylston Street/ Washington Street/ Essex Street	13.1	B	17.3	C
Stuart Street/ Tremont Street	11.7	B	28.2	D
Stuart Street/ Washington Street/ Kneeland Street	11.5	B	19.6	D
Essex Street/ Surface Artery/ Lincoln Street	37.2	D	56.8	E
Tremont Street/ Park Street	14.9	B/C	28.4	D
Tremont Street/ Avery Street	4.2	A	5.2	A/B
Washington Street/ Avery Street	6.8	B	9.9	B
Kneeland Street/ Surface Artery	10.9	B	23.8	C/D
Lincoln Street/ Summer Street/ Bedford Street	10.3	B	12.5	B

	AM Peak Hour				PM Peak Hour			
Unsignalized Intersection	Vol.	Cap.	Res. Cap.	LOS	Vol.	Cap.	Res. Cap.	LOS
Essex Street/ Harrison Ave. Extension								
- Harrison LT	57	224	166	D	480	95	-385	F
- Harrison TH	166	268	102	D	257	120	-137	F

As Table 7 displays, the expanded Study Area intersection of Lincoln Street/Summer Street/Bedford Street is projected to operate at Level of Service "B" during both peak hours within the year 1996 No-Build condition, and the intersection of Kneeland Street/Surface Artery is projected to operate at Level of Service "B" during the AM Peak Hour and Level of Service "C/D" during the PM Peak Hour. The Study Area intersection of Boylston Street/Washington Street/Essex Street, re-analyzed to include an all-pedestrian phase in its signal phasing, is projected to operate at level of service "B" in the AM Peak Hour, and at Level of Service "C" in the PM peak hour. Otherwise, all No-Build capacity analyses results are as presented in the DPIR/DEIR.

Table 8 displays the Build capacity analyses for the expanded Study Area, inclusive of the intersections of Kneeland Street/Surface Artery, and Lincoln Street/Summer Street/Bedford Street at Year 1996 with the Proposed Project. All Build capacity analyses incorporate the revisions to the trip distribution assumptions (as described in the response to Comment #1 above), and also incorporate a 1.59 vehicle occupancy factor for office-related vehicle trips (as described in the response to Comment #2 of the EOTC letter).

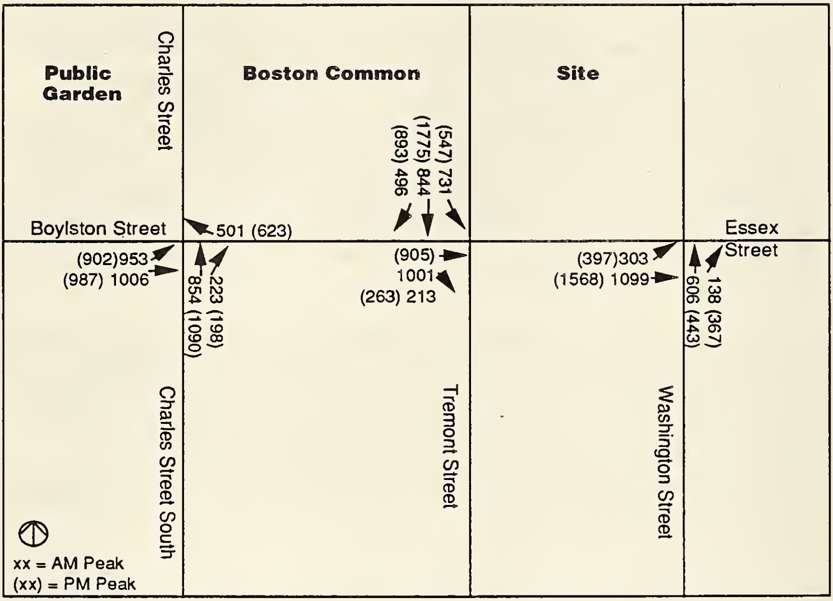


Figure 6 . Vehicle Volumes - Build Conditions (1996)-Intersections 1,2,3

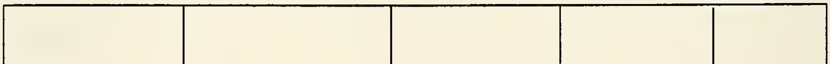


Figure 7. Vehicle Volumes - Build Conditions (1996)-Intersections 4,5,6

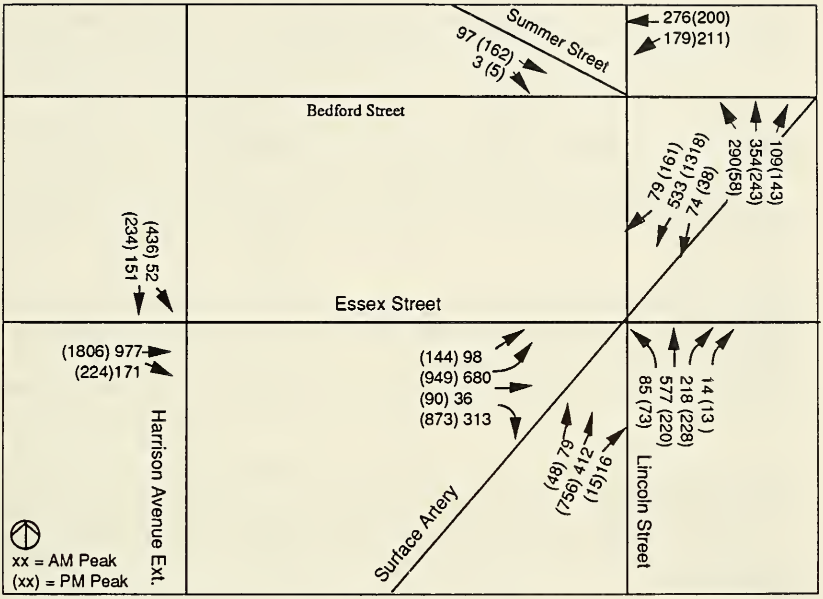


Figure 8. Vehicle Volumes - Build Conditions (1996)-Intersections 7,8,9

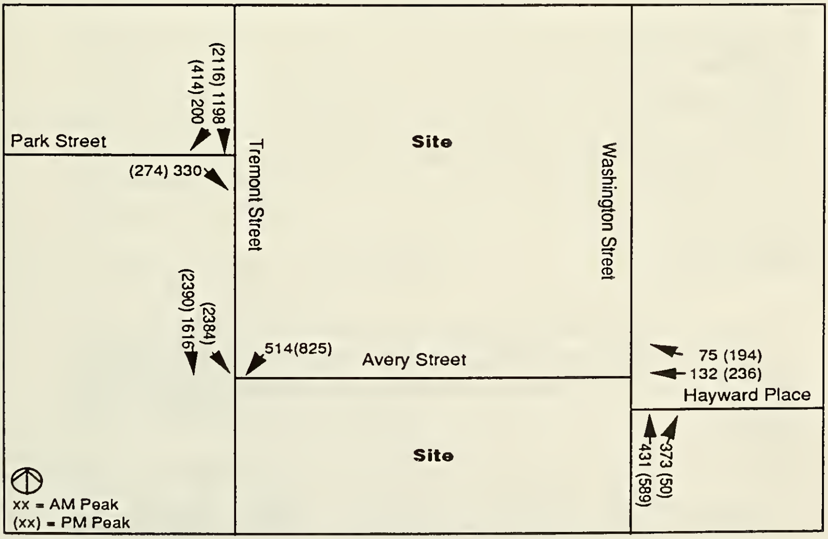


Figure 9. Vehicle Volumes - Build Conditions (1996)-Intersections 10,11,12

Table 8: Capacity Analyses/Build Conditions (1996)

	AM Peak Hour		PM Peak Hour	
Signalized Intersection	Average Vehicle Delay in Seconds	LOS	Average Vehicle Delay in Seconds	LOS
Boylston Street/ Charles Street	14.0	B	16.5	C
Boylston Street/ Tremont Street	52.0	E	69.3	F
Boylston Street/ Washington Street/ Essex Street	15.4	B/C	24.5	C/D
Stuart Street/ Tremont Street	11.8	B	32.0	D
Stuart Street/ Washington Street/ Kneeland Street	12.2	B	20.7	C
Essex Street/ Surface Artery/ Lincoln Street	43.7	E	92.4	F
Tremont Street/ Park Street	17.6	C	37.7	D
Tremont Street/ Avery Street	9.3	B	15.6	B/C
Washington Street/ Avery Street	10.0	B	21.3	C
Kneeland Street/ Surface Artery	11.2	B	31.3	D
Lincoln Street/ Summer Street/ Bedford Street	10.3	B	12.5	B

	AM Peak Hour				PM Peak Hour			
Unsignalized Intersection	Vol.	Cap.	Res. Cap.	LOS	Vol.	Cap.	Res. Cap.	LOS
Essex street/ Harrison Ave. Extension								
- Harrison LT	57	180	123	D	480	26	454	F
- Harrison TH	166	219	53	E	257	35	-223	F

A comparison of Table 8 above to Table 15 of the DPIR/DEIR (Capacity Analysis/ Build Condition 1996-Proposed Project) displays a consistency of resulting intersection average vehicle delays and Levels of Service among those intersections common to both Tables, with the exception of the Intersection of Boylston Street/ Washington Street/Essex Street, at which the AM peak hour level of service is projected to be at the "B/C" level, and the PM peak hour level of service is projected to be "C/D". This is due to the re-analysis of the intersection to include an all-pedestrian phase in the signal phasing, but reflects no reduction in peak hour level of service from No-Build conditions.

The expanded Study Area intersection of Kneeland Street/Surface Artery is projected have peak hour Levels of Service of "B" in the morning and "D" in the afternoon at 1996 Build volumes, and the intersection of Lincoln Street/Summer Street/Bedford Street is projected to continue to have peak hour Levels of Service of "B" in both the morning and afternoon.

As presented in the DPIR/DEIR, mitigations necessary to bring about acceptable peak hour operations to Study Area intersections under the Full-Build scenario (including Commonwealth Center, Boston Crossing, and One Lincoln Street) include:

1. *Boylston Street/Tremont Street*

   It is proposed that parking spaces on the southern edge of the Boylston Street approach to this intersection be removed for a distance of 150 feet from the intersection (a loss of approximately eight parking spaces) in order to allow for an exclusive right turn lane within the existing right-of-way. This mitigation, assuming a retiming of the signal within existing phasing, will allow for peak hour Levels of Service of "D" within the morning and afternoon peak hours.

2. *Essex Street/Harrison Avenue Extension*

   It is proposed that this intersection be signalized to provide for a two-phase controller with pedestrian movement concurrent with vehicle flow. This proposed signal would provide for Levels of Service "A" in the AM Peak Hour, and "C/D" in the PM Peak Hour.

3. *Essex Street/Surface Artery/Lincoln Street*

   The DPIR/DEIR proposed that signal operations at this intersection be re-phased to allow for concurrent crossing instead of the existing manually-actuated all-pedestrian phase. As a result of joint meeting among representatives of the City of Boston Department of Transportation and the Proponent of the Commonwealth Center, Boston Crossing, and One Lincoln Street developments, the intersection has been re-analyzed to reflect the following mitigation measures:

- The Essex Street eastbound approach is widened to allow for three approach lanes (instead of the existing two lanes) in conjunction with the introduction of two-direction operations on Essex Street as far west as Kingston Street.

- The northbound Lincoln Street approach is provided for four approach lanes by virtue of parking restriction implementation on both sides of Lincoln Street.

- The southbound Surface Artery approach is widened to four lanes, in conjunction with a decrease in width to two lanes on the Surface Artery northbound approach.

- Left turns on both approaches of the Surface Artery are prohibited.

These measures in conjunction with existing signal phasing which provides for an all-pedestrian phase, are projected to provide for Level of Service "C/D" operations in the AM Peak Hour and Level of Service "D" operations in the PM peak hour.

Other recommended mitigation measures have been identified for additional intersections (listed in Table 23 of this report) as part of a cooperative effort with the Boston Crossing and One Lincoln Street projects.

In addition to the above mitigations, enforcement of existing restrictions regarding illegal parking and double parking within the Study Area is necessary to provide for acceptable operating conditions therein at No-Build and Build volume levels.

Comment #3:

Topic: Transportation

Comment: Analyze Proposed Project's incremental impact on the regional traffic network.

Response:

Table 9 displays projected Year 1995 volumes, by direction, or selected regional highway network segments within both No-Build and Build conditions. The Year 1995 No-Build volumes, herein assumed to approximate Year 1996 volumes upon the completion of Commonwealth Center, are provided by the Central Transportation Planning staff.

Table 9: Regional Highway Network Daily Volume Increases Due to Proposed Project

Segment	Direction	Year 1995 No-Build Volumes	Year 1995 Build Volumes	Percent Increase
Tobin Bridge	NB	60,700	61,473	1.3
	SB	55,500	56,273	1.4
I-93 north of Rte 1	NB	63,600	64,030	0.6
	SB	66,900	67,330	0.6
Storrow Drive east of Mass. Ave.	EB	62,200	62,658	0.7
	WB	56,300	56,758	0.8
Mass. Turnpike east of Beacon Park	EB	67,400	67,858	0.7
	WB	65,200	65,658	0.7
Southeast Expressway south of Columbia Ave.	NB	95,500	96,387	0.9
	SB	95,800	96,687	0.9
Route 1A south of Rte. 16	NB	27,400	27,686	1.0
	SB	28,000	28,286	1.0

As Table 9 presents, the analyzed segments of the regional highway network are projected to withstand increases of between 0.6 and 1.4 percent on a daily basis as a result of the Proposed Project.

Comment #4:

Topic: Transportation

Comment: Outline the differences in method and assumptions in formulating the transportation access plans for the Commonwealth Center and Boston Crossing Projects.

Response:

The differences in methods and assumptions for analyzing common intersections between the DPIR/DEIR for Commonwealth Center and Boston Crossing include:

1) The DPIR/DEIR for Commonwealth Center employed Study Area intersection volume counts for Year 1996 as provided within the City of Boston's Midtown Cultural District Plan (March, 1988). Although the Plan's intersection volumes reflected Year 1998 volume conditions within the Midtown Cultural District, the Commonwealth Center DPIR/DEIR assumed these volumes would represent a conservative and worst case estimate of Year 1996 volumes within its Study Area. The DPIR/DEIR for Boston Crossing employed these and other intersection volumes, factored to Year 1996, and balanced throughout the Study Area network to suggest that all vehicle trips entering the Study Area within either peak hour also exit the Study Area within that same peak hour. These differing assumptions between the two documents resulted in fundamental differences in total intersection volumes, and more importantly, in critical turning movement volumes.

2) The DPIR/DEIR for Commonwealth Center, in analyzing its Study Area intersections, followed the intersection operational assumptions employed within the Midtown Cultural District Plan, specifically in terms of adjustment factors for area type. The Boston Crossing DPIR/DEIR employed an adjustment factor for Central Business District areas which automatically increases all intersection volumes by ten percent.

3) The DPIR/DEIR's for both projects employ varying signal timings for common Study Area intersections; specifically, assumed times for yellow and red phases inherent to each signal's operation. The Boston Crossing DPIR/DEIR assumed three and four second of yellow and red time, for example, while the Commonwealth Center DPIR/DEIR assumed a more conservative five seconds of red and yellow time.

4) Other differences in assumed signal phasings, approach arrival types, peak hour factors, pedestrian crossing volumes and signal phasing for pedestrian crossings, heavy vehicle factors, grades, and lane widths are also evident between the two DPIR/DEIR's; all of which would serve to produce minor variations in Level of Service analysis results between the two documents.

The assumptions employed in the DPIR/DEIR for the Commonwealth Center project remain valid and the FPIR/FEIR scoping determination does not require a reworking of the traffic analysis.

In addition, the Project Proponent has worked in cooperation with the proponents of Boston Crossing and One Lincoln Street to coordinate findings and identify mitigation measures for the Study Area intersections.

Comment #5:

Topic: Transportation

Comment: Conduct an area-wide origin and destination study of pedestrian traffic in the site area, including volumes and "desire lines". (Clarification of this comment appears in Appendix A-BRA Documents).

Response:

Further review of peak hour pedestrian volumes, as accumulated for the DPIR/DEIR on sidewalks and in crosswalks in the immediate vicinity of the site, has been undertaken to determine the probable desire lines of existing pedestrian movements around the existing structures on the site, and those which would likely result both around and through the site within the Build scenario. Table 10 displays existing pedestrian desire lines for the AM and PM Peak Hours on streets in the vicinity of the site.

Table 10: Peak Hour Pedestrian Desire Lines, Existing Conditions

Peak Hour	Sidewalk	Total Direction	Percent of Ped. Volume	Peak Volume
AM	Tremont Street	North	424	11
		South	804	21
	Washington Street	North	553	15
		South	375	10
	Boylston Street	East	586	15
		West	840	22
	Avery Street	East	111	3
		West	112	3
				100
PM	Tremont Street	North	964	18
		South	679	13
	Washington Street	North	1024	19
		South	1245	23
	Boylston Street	East	569	11
		West	434	8
	Avery Street	East	164	3
		West	289	5
				100

As Table 10 displays, the principal pedestrian desire lines in the AM Peak Hour in the vicinity of the site are in a westerly direction along Boylston Street between Washington Street and Tremont Street, and in a southerly direction along Tremont Street to the south of Boylston Street and the Boylston Station of the MBTA. These desire lines represent selected paths of about 43 percent of pedestrians within the AM Peak Hour. Another 15 percent of AM Peak Hour pedestrians each have desire lines along Washington Street northbound to the north of Boylston Street/Essex Street, and Boylston Street/Essex Street eastbound of Tremont Street. It is presumed that a significant portion of these pedestrian paths involve movements from either the Boylston Station of the MBTA Green Line or the Chinatown Station of the Orange Line to places of employment located outside the immediate Study Area within which the site is located.

During the PM Peak Hour, the predominant pedestrian desire lines are displayed in a southerly direction along Washington Street in the direction of the Chinatown Station of the Orange Line, in a northerly direction on Washington Street, and in a northerly direction on Tremont Street toward the Boylston Station of the Green Line.

Table 11 displays similar pedestrian desire lines within the Build scenario, again assuming pedestrian volume estimates within crosswalks in the vicinity of the site as presented within the DPIR/DEIR. These pedestrian volumes, at Year 1996, include those projected to be generated by pending developments within the vicinity of the Study Area, as well as pedestrian volumes to be generated by the Proposed Project.

Table 11: Peak Hour Pedestrian Desire Lines, Build Conditions, Year 1996

Peak Hour	Sidewalk	Direction	Total Ped. Volume	Percent of Peak Volume
AM	Tremont Street	North	892	8
		South	1256	12
	Washington Street	North	1785	17
		South	911	8
	Boylston Street	East	2908	27
		West	845	8
	Avery Street	East	1984	18
		West	190	2
				100
PM	Tremont Street	North	1342	10
		South	921	6
	Washington Street	North	2037	15
		South	3172	23
	Boylston Street	East	1640	12
		West	2775	21
	Avery Street	East	472	3
		West	1610	11
				100

As Table 11 presents, during the AM Peak Hour at Year 1996 Build conditions, the predominant pedestrian desire line is in an easterly direction on Boylston Street from the Boylston Station of the Green Line. A significant percentage of new pedestrian volumes on the Tremont Street easterly crosswalks at both Boylston Street and Avery Street represent new pedestrians to the area resulting from both the Proposed Project and the Boston Crossing development, and also represent potential pedestrian movements through the site at the ground floor level. Other predominant pedestrian desire lines in the AM Peak Hour include northerly movement on Washington Street sidewalks from the Chinatown Station of the Orange Line, and also southerly movements on Tremont Street sidewalks from the Boylston Street Station.

During the PM Peak Hour the predominant pedestrian desire line is the southerly direction on Washington Street sidewalks to the Chinatown Station and beyond, and the westerly movement on Boylston Street in the direction of the Boylston Station. Again, a significant component of these pedestrian volumes are trips related to both the Proposed Project and the Boston Crossing development which could potentially pass through the Commonwealth Center site via available ground floor pedestrian pathways. Other predominant pedestrian desire lines include the easterly movement on Boylston Street, and the northerly direction on Washington Street.

Comment #6

Topic: Transportation

Comment: Conduct a pedestrian demand and capacity analysis on project area sidewalks.

Response:

The pedestrian demand and capacity analyses on Study Area crosswalks has been presented within the DPIR/DEIR. The complementary capacity analyses results for Study Area sidewalk reservoir space is presented in Table 12 below. These analyses are conducted in accordance with recommendations within Urban Space for Pedestrians (Pushkarev and Zupan, 1975), and are presented for the AM, Mid-day, and PM Peak Hours.

Table 12: Study Area Sidewalk Service Levels, Build Conditions (1996)

Intersection	Peak Hour	Crosswalk	Total Volume	Average Crosswalk Flow (Peds/Min./Foot)	Required Depth of Reservoir Space (ft)1	Service Level
Tremont/ Avery	AM	North	1248	5.07	12.7	Impeded
		East	452	1.28	3.2	Unimpeded
	Mid-Day	North	1393	5.66	14.2	Impeded
		East	1143	3.23	8.1	Impeded
	PM	North	1237	3.61	9.0	Impeded
		East	590	2.71	6.8	Impeded
Tremont/ Boylston	AM	North	1380	23.00	57.5	Constrained
		South	780	13.00	32.5	Constrained
		East	657	10.95	27.4	Constrained
		West	1039	17.32	43.3	Constrained
	Mid-Day	North	1380	23.00	57.5	Constrained
		South	1508	25.13	62.8	Constrained
		East	1139	18.98	47.5	Constrained
		West	1008	16.80	42.0	Constrained
	PM	North	1143	19.05	47.6	Constrained
		South	1013	16.88	42.2	Constrained
		East	591	9.85	24.6	Constrained
		West	1082	18.03	45.1	Constrained
Washington/ Boylston	AM	North	1067	2.67	6.7	Impeded
		South	526	1.31	3.3	Unimpeded
		East	474	2.38	5.9	Impeded
		West	687	3.44	8.6	Impeded
	Mid-Day	North	N/A	—	—	—
		South	N/A	—	—	—
		East	N/A	—	—	—
		West	N/A	—	—	—
	PM	North	1482	4.04	10.1	Impeded
		South	777	2.11	5.3	Impeded
		East	1192	5.16	12.9	Impeded
		West	1107	4.79	11.9	Impeded
Washington/ Avery	AM	North	926	6.17	15.4	Impeded
		South	906	3.57	8.9	Impeded
		East	1107	2.23	5.6	Impeded
		West	428	2.85	7.1	Impeded
	Mid-Day	North	550	3.67	9.2	Impeded
		South	767	3.02	7.6	Impeded
		East	3541	7.14	17.9	Constrained
		West	1206	8.04	20.1	Constrained
	PM	North	845	5.63	14.1	Impeded
		South	1122	4.70	11.8	Impeded
		East	2025	4.42	11.1	Impeded
		West	885	5.90	14.8	Impeded

1. An average five square feet per person is assumed in determining required depth of reservoir space as a function of both ends of the crosswalks.

The results of the analyses in Table 12 display sidewalk reservoir spaces service levels which are similar to those service levels described in the DPIR/DEIR for Study Area crosswalks. For example, all crosswalks described in the DPIR/DEIR as "constrained", also have sidewalk reservoir spaces which are "constrained" in service level.

Comment #7:

Topic: Transportation

Comment: Explore in more detail mitigation measures which address degradations in pedestrian Levels of Service.

Response:

The DPIR/DEIR displays analyses results which suggest constrained pedestrian service levels within crosswalks in the vicinity of the Commonwealth Center site, and further analyses results presented herein suggest constrained service levels within reservoir spaces on sidewalks at either end of the crosswalks. Congestion within reservoir spaces on sidewalks described within Urban Space for Pedestrians (p. 110) constrainment is a function of pedestrian density at or near the curb which ranges between three and five square feet per person, but increasing to approximately seven square feet per person at or beyond 20 feet from the curb. Although pedestrians waiting as far back as 20 or more feet from the curb in order to cross the street when the signal allows is considered to be a "constrained" service level, this condition is considered by most pedestrians to be an acceptable condition due to the relatively short duration of the condition and the knowledge that the waiting pedestrians will move forward as a group simultaneously. Urban Space for Pedestrians suggests that limited sidewalk reservoir space on narrow sidewalks can sometimes force waiting pedestrians to overflow onto the street right-of-way while waiting, unless the sidewalks themselves are widened at street corners. In concert with the construction of the Parcel 30 building on Parcel 30 during the first phase of the development, the realignment and reversal of Avery Street by the City will serve to increase sidewalk widths on both edges of Avery Street by six inches. In addition, a widening of the sidewalk on the western edge of Washington Street by three feet along Parcel 30 and part of the Keith Block is expected to result. Due to the impracticality of widening the existing sidewalks on Boylston and Tremont Streets, it is proposed instead that the crosswalks at the Boylston/Washington, Boylston/Tremont and Avery/Tremont intersections be each widened from the existing average ten feet of width, to between 18 and 20 feet; thereby doubling crosswalk capacity and easing projected constrained pedestrian conditions.

Comment #8:

Topic: Transportation

Comment: Provide plans which show pedestrian connections to existing and planned public transportation stations.

Response:

The upper section of the MBTA outbound station entry to the Orange Line Chinatown Station has been relocated from its existing position in order to provide more direct access to the Project's interior pedestrian ways, and to provide more continuous retail activity wrapping the corner of the base of the south tower on Parcel 30 at the Boylston/Washington Street intersection (see Figure 10). The existing temporary shell entrance on Boylston Street would be replaced by a permanent enclosure as part of the entry loggia to the building lobby (see Figure 11). In addition, the Project Proponent has identified a location that could accommodate the MBTA's future elevator for handicapped access to the outbound platform level of this station (see Figure 12). Connections between outbound and inbound stations are not currently being considered due to the relative difference in elevations of inbound and outbound tunnels making the only crossing possible below the track levels. A previous such connection within this station has been closed due to security hazards.

No entry has been designed for connection of the Proposed Project to either the present Green Line Boylston Street Station, or to the future planned station expansion as part of the MBTA's Replacement Transit Improvement Project. Possible locations for this entry connection have been identified at the ground floor of the Project in the retail area adjacent to the Evans House along Tremont Street and are detailed in Figure 12. The Project Proponent will continue to work with the MBTA in coordinating their ongoing planning for this planned station expansion with plans for the Project, should a connection between the two prove desirable. Due to the possible location of this future entry within the Piano Row National Register Historic District, the design of this station entry on Tremont Street may require the review and approval of the Boston Landmarks Commission and the Massachusetts Historic Commission.

Comment #9:

Topic: Transportation

Comment: Include circulation patterns for pedestrians and vehicles by destination.

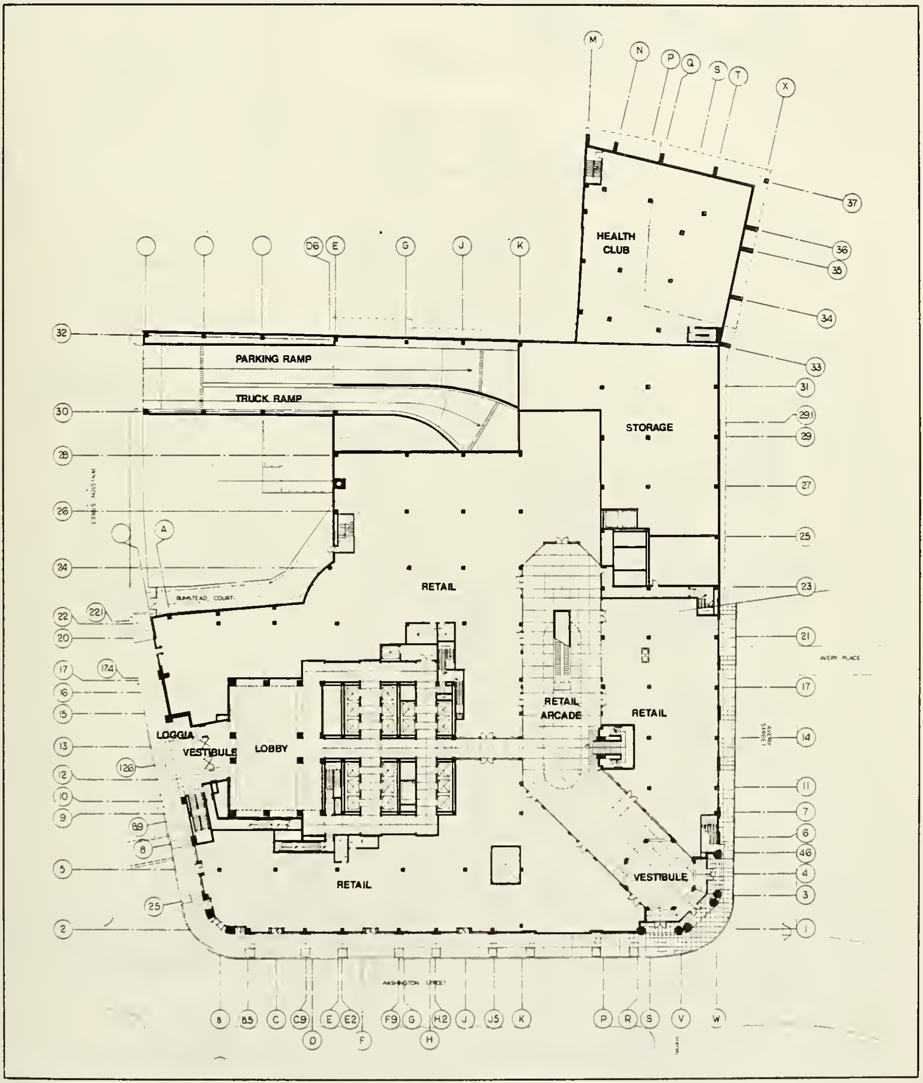


Figure 10. Parcel 30-Ground Floor Plan

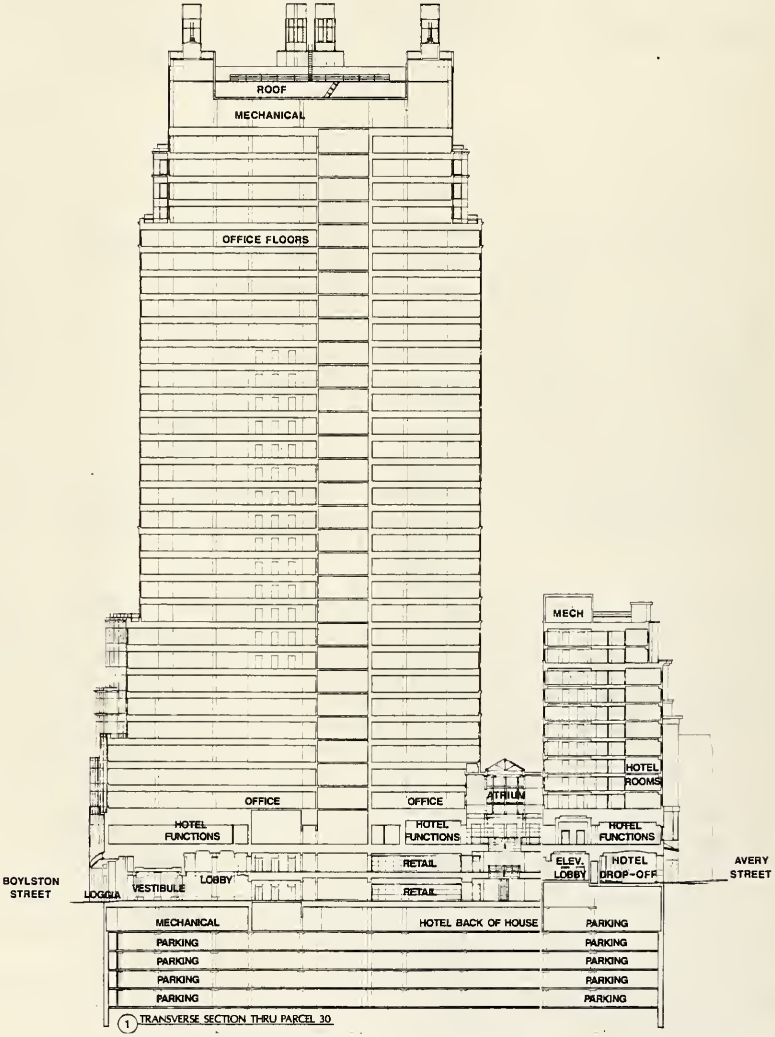


Figure 11. Parcel 30- Transverse Section

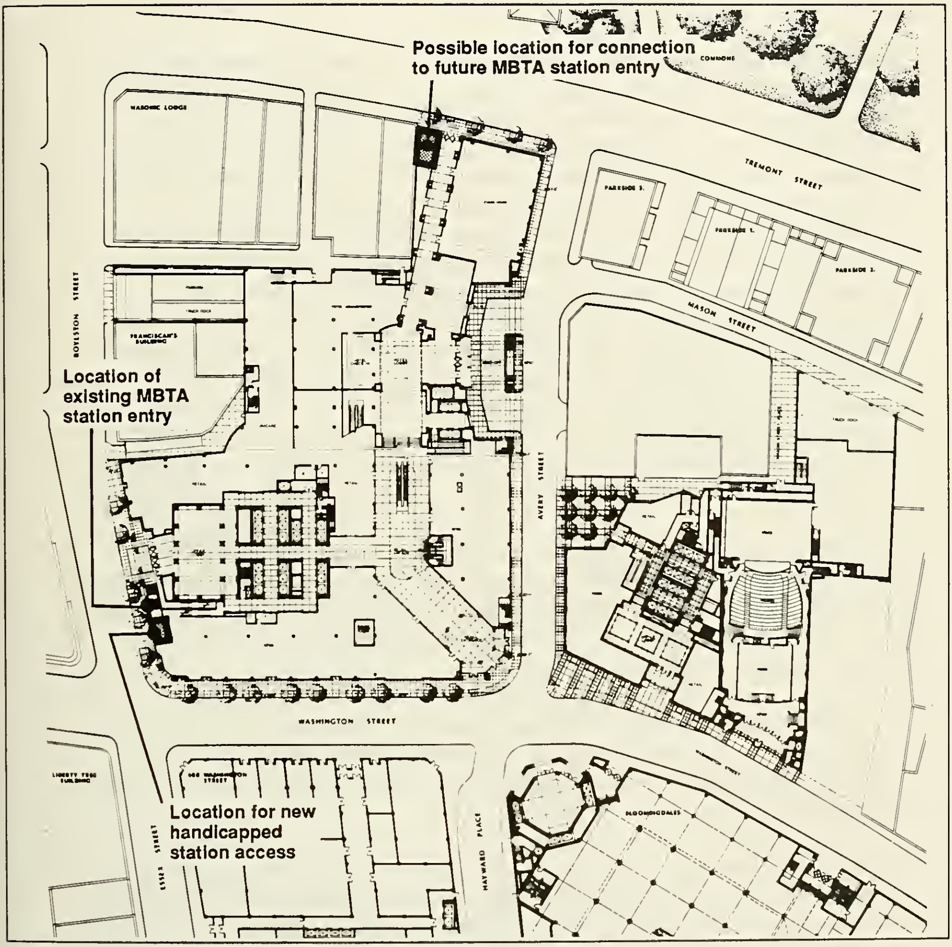


Figure 12. Location of Existing and Planned Public Transportation Stations

Response:

Ground floor public pedestrian connections within the Parcel 30 block, are anticipated to be open to the public on weekdays between 7:00 AM and 7:00 PM. Pedestrian entries are available on Boylston Street at a point mid-way between Washington Street and Bumstead Court, at the corner of the intersection of Washington Street and Avery Street, at the corner of the intersection of Tremont Street and Avery Street, and at the hotel entrance point on Avery Street approximately mid-way between Washington Street and Tremont Street (see Figure 13). All access points are connected within the building interior via ground floor pedestrian concourses. These concourses, due to a grade change between Washington and Tremont Street, are on two levels which are interaccessible via the parking garage elevators and an escalator between the concourse at the lower level serving the Washington Street and Boylston Street entrances, and the upper concourse serving the Avery Street and Tremont Street entrances. The lower concourse provides principal access to the office lobby and retail shops located at the Washington Street level, and the upper concourse provides access to retail shops on the Tremont Street level, and the hotel lobby and reception area (see Figure 14).

Pedestrian access to the Keith Block is available on Washington Street at both the office lobby and the theater lobby, and on Avery Street at the office lobby through a proposed public open space located midway between Washington Street and Mason Street (see Figure 14). Figure 15 illustrates the internal pedestrian circulation pattern within the Keith Block.

Vehicular access is available at the Parcel 30 block on Boylston Street for both delivery vehicles and other vehicles destined for the parking garage. Delivery vehicle access to the Keith Block is available on Mason Street to the north of Avery Street (see Figure 16).

With regard to the capacity of the proposed escalator to handle potential pedestrian peak loads within the public pedestrian concourse, an analysis of potential capacity has been conducted in accordance with recommendations within Urban Space for Pedestrians (Pushkarev and Zupan, 1975). That book suggests a maximum design value for escalator capacity of 90 pedestrians per minute, per direction (assuming a standard 40 inch wide escalator tread). It is assumed that potential users of the concourse in the east-west direction in which the escalator is proposed will essentially represent those pedestrians which otherwise would pass in an easterly or westerly direction on Avery Street sidewalks. Projected pedestrian volumes, per direction on those sidewalks, at Build pedestrian levels, are a maximum of 1,700 in either direction during any one peak hour. Assuming a capacity of 90 pedestrians per minute, on average, per direction on the escalator, a maximum pedestrian flow of just over 28 persons per minute results, suggesting more than enough capacity on the escalator to handle these loads.

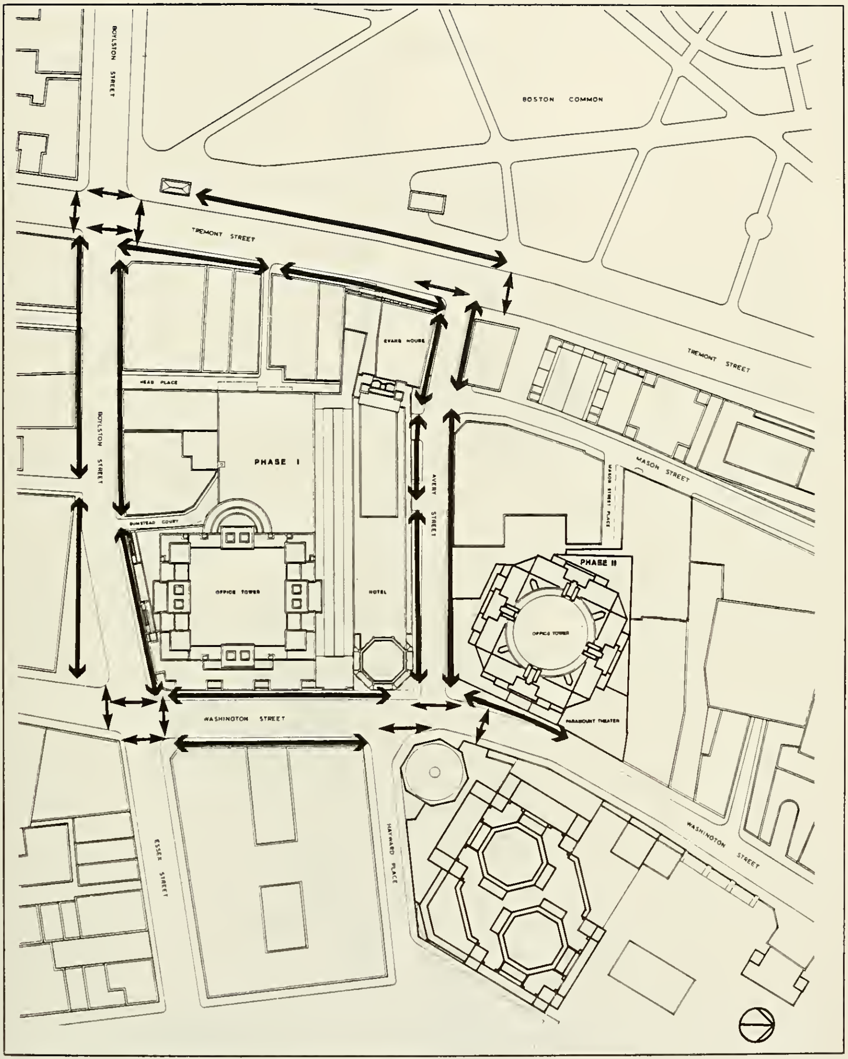


Figure 13. Sidewalk Pedestrian Circulation Pattern

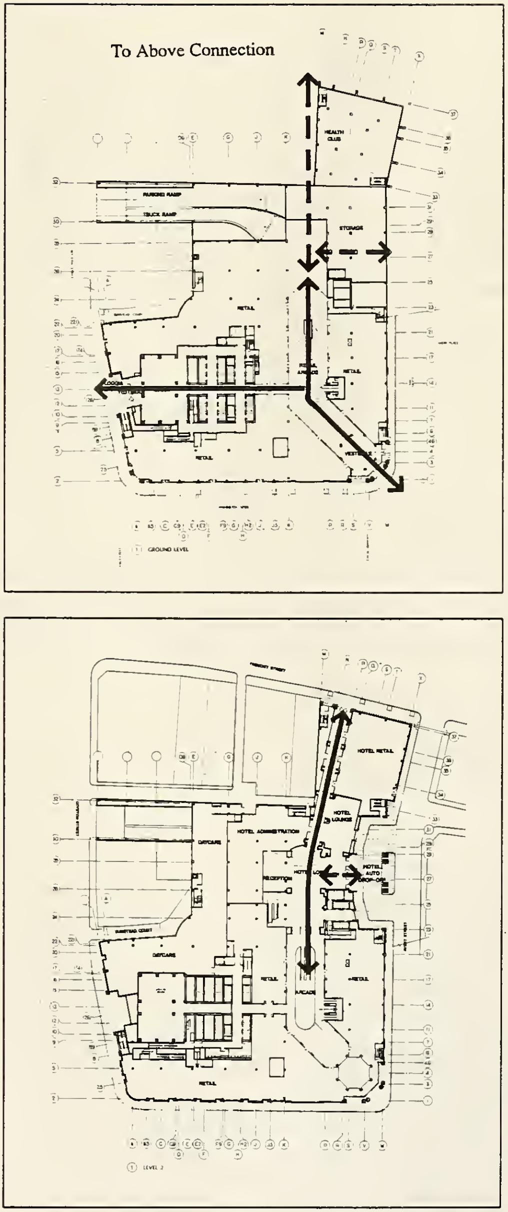


Figure 14. Parcel 30- Internal Pedestrian Passageways (Ground Level and Level 2)

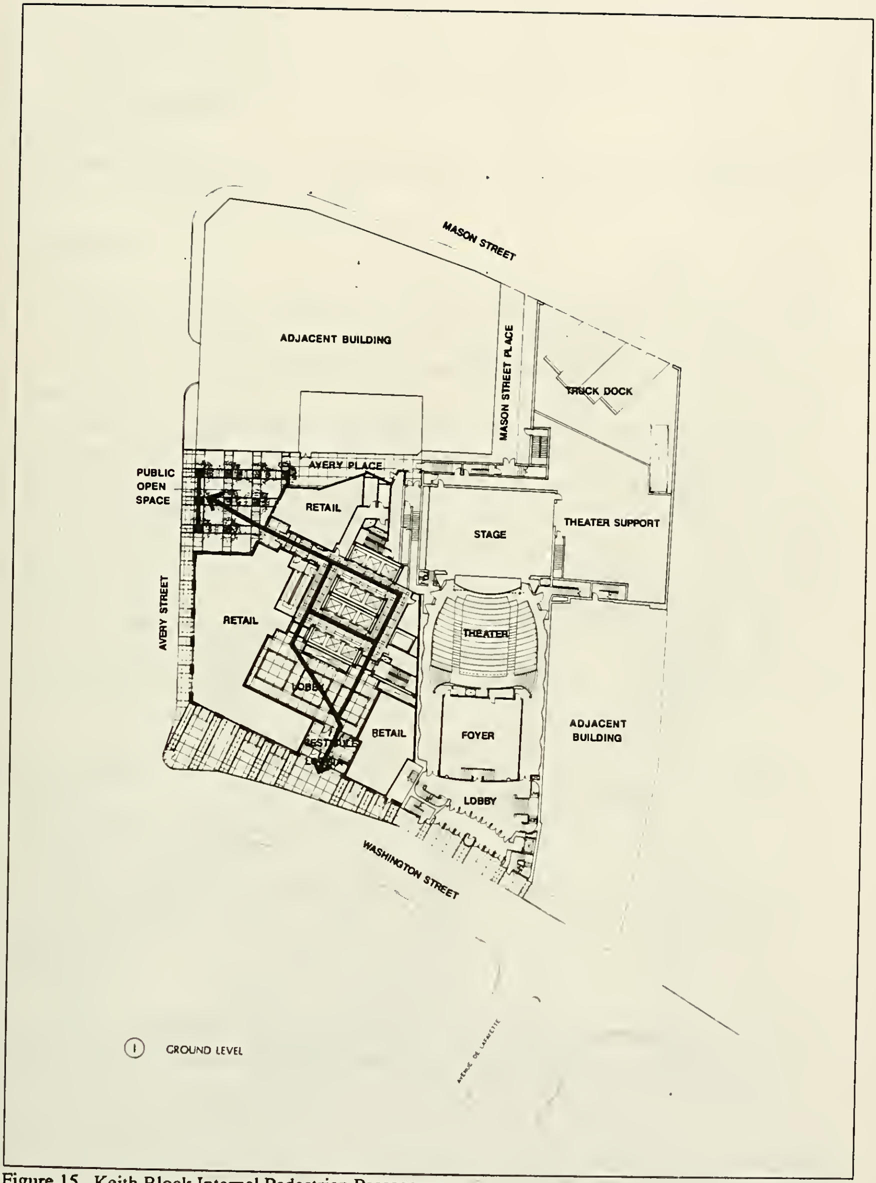


Figure 15. Keith Block Internal Pedestrian Passageways

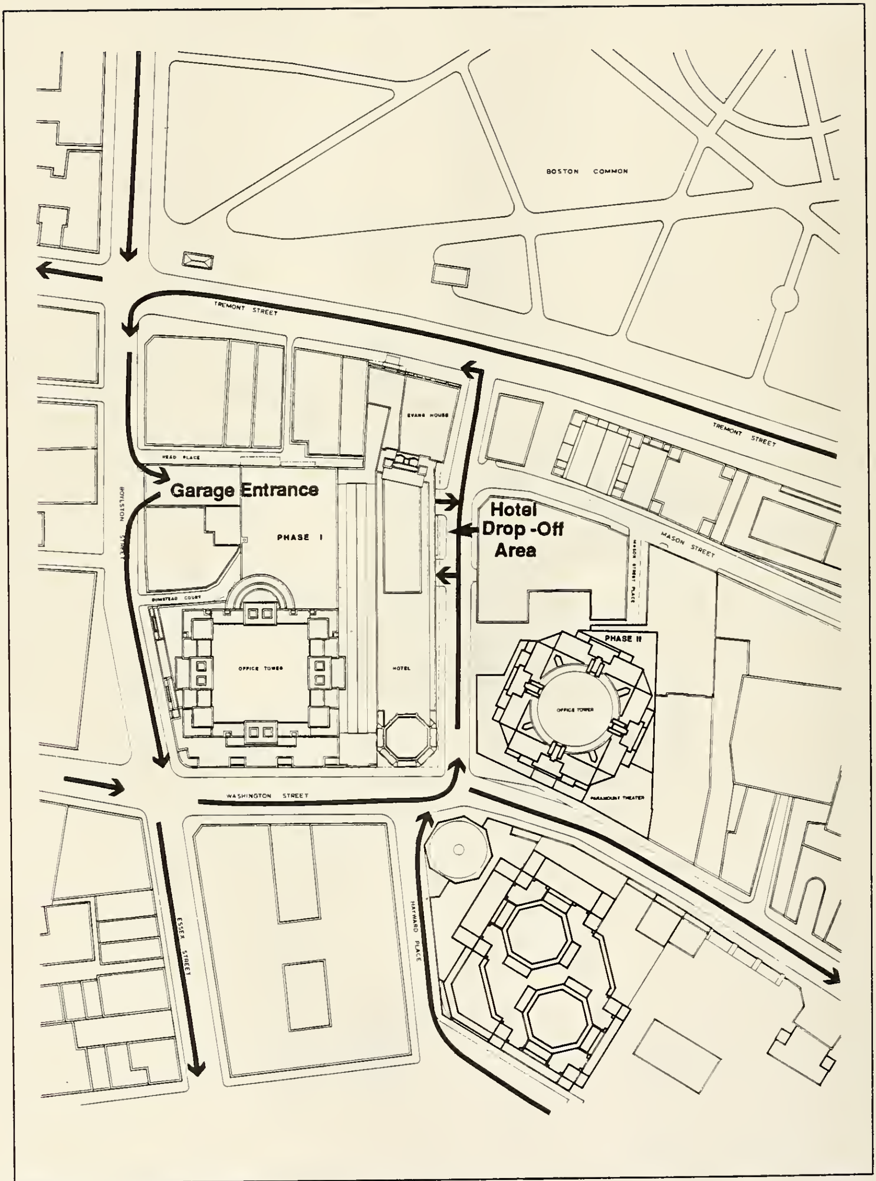


Figure 16. Vehicular Circulation Pattern in the Vicinity of the Site

Comment #10:

Topic: Transportation

Comment: Provide information regarding operation of the drop-off and pick-up area of the hotel.

Response:

The drop-off and pick-up area of the proposed hotel will be located on the southerly edge of Avery Street at a point immediately east of Mason Street (see Figure 17). The U-shaped drop-off area will be 101 feet in length at the Avery Street sidewalk, with two-lane 28-foot wide one-way inbound and egress points, separated by a 45-foot long by a 14-foot wide island inclusive of a 7 1/2 foot wide sidewalk and building supports. The drop-off/pick-up area will be under cover of the building overhang, and will entail a 19-foot wide by 101-foot long travel lane for guest or patron drop-off and pick-up. The 19-foot wide lane would have sufficient width to allow for short-term curbside parking of as many as five vehicles without hindering movement of other through-vehicles removed from the curbside. The travel lane of the drop-off/pick-up area will be separated from the hotel structure by a 7 1/2 foot wide sidewalk, effectively continuing the Avery Street sidewalk along the entire block. The Avery Street hotel entrance is to be used primarily for guest/patron drop-off and pick-up by private vehicles, taxis and shuttle vans. Valet parking for hotel guests will be available at this location.

Comment #11:

Topic: Transportation

Comment: Provide information on the operation of the taxi drop-off and pick-up area.

Response:

Other than at the hotel drop-off/pick-up point, the Proposed Project will not provide for specific taxi drop-off/pick-up areas. However, these activities will presumably take place on Washington Street, with potential taxi users securing taxis from the passing traffic stream in the vicinity of the site and from a taxi queuing area on Washington Street proposed as part of a general sidewalk widening along this block (see Figure 37). Hotel guest patron taxi drop-off will take place at the above-described hotel entrance, and hotel door persons will secure taxis for departing hotel patrons from the passing traffic stream on Avery Street or from the taxi queuing area

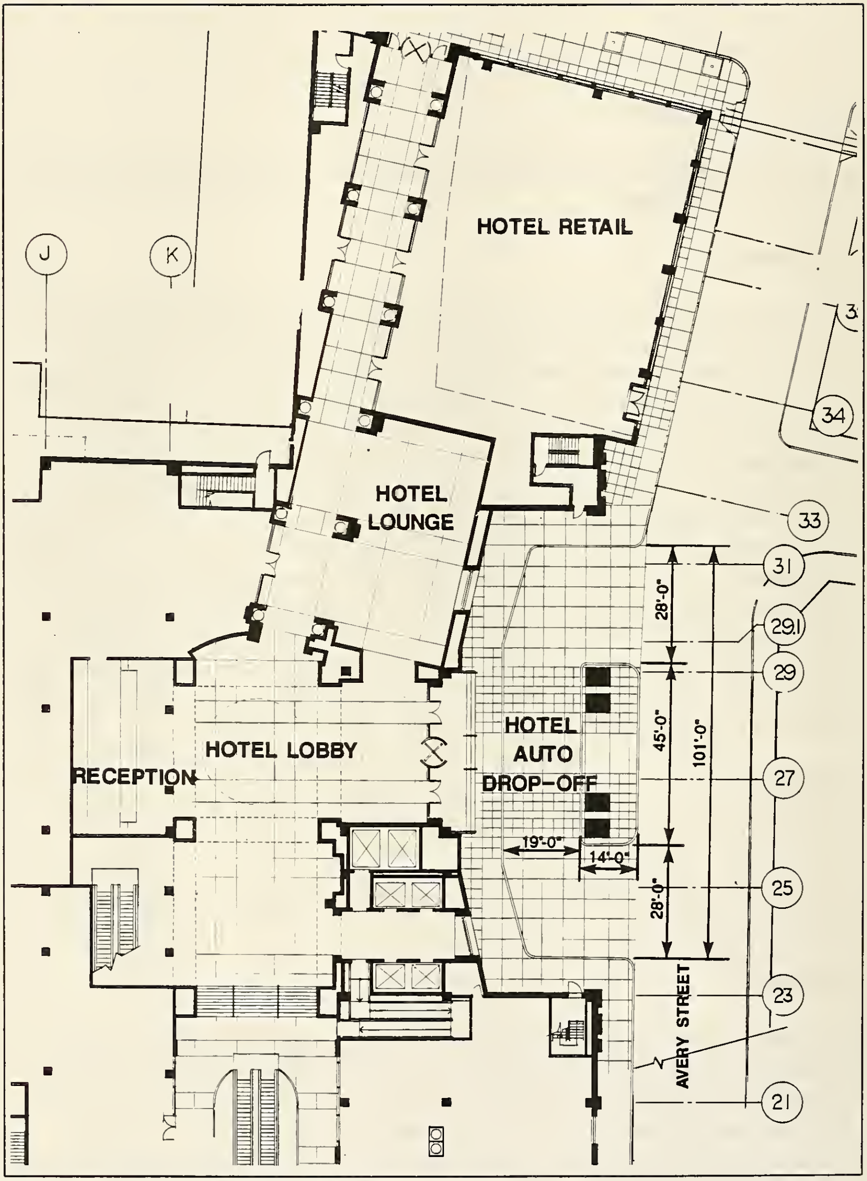


Figure 17. Hotel Drop-Off and Pick-Up Area

proposed by the Project Proponent on Washington Street . There will also be sufficient room at the hotel entrance for queuing of two to five taxis waiting for potential fares within the short-term parking spaces at peak times.

Comment #12:

Topic: Transportation

Comment: Provide information on the methods of operation for taxi service to and from the site.

Response:

See response to Comment #11 above.

Comment #13:

Topic: Transportation

Comment: Provide analysis of proposed loading areas, including anticipated delivery volume and schedule; number, location and dimension of docks; and size and maneuvering space.

Response:

A total of 11 loading docks are to be located within the interior subgrade of the Parcel 30 building with access on Boylston Street adjacent to the access point to the parking garage. Four of the loading docks will have dimensions of 30-feet in length by 13-feet in width, and the remaining seven docks will have dimensions of 35-feet in length by 13-feet in width. Truck access will be via a down-ramp from Boylston Street, and the interior maneuvering space will entail dimensions of 96-feet by 53-feet, for a total of 5,088 square feet of maneuvering space (see Figure 18).

Within the Keith Block, a total of four loading docks of 30-feet in length by 13-feet in width are to be located at grade to the immediate east of Mason Street. All delivery truck access will be via Mason Street (see Figure 19). The hours of operation for all service and loading docks will be 8:00 AM to 4:00 PM.

According to standards for the number of truck docks required per type of land use, as referenced in Timer Saver Standards for Site Planning (DeChiara and Koppleman, 1984) a single truck dock is required for each 100,000 square feet of office and hotel space. This suggests a need for 13 loading docks in Parcel 30, and a need for 7 loading docks in the Keith Block.

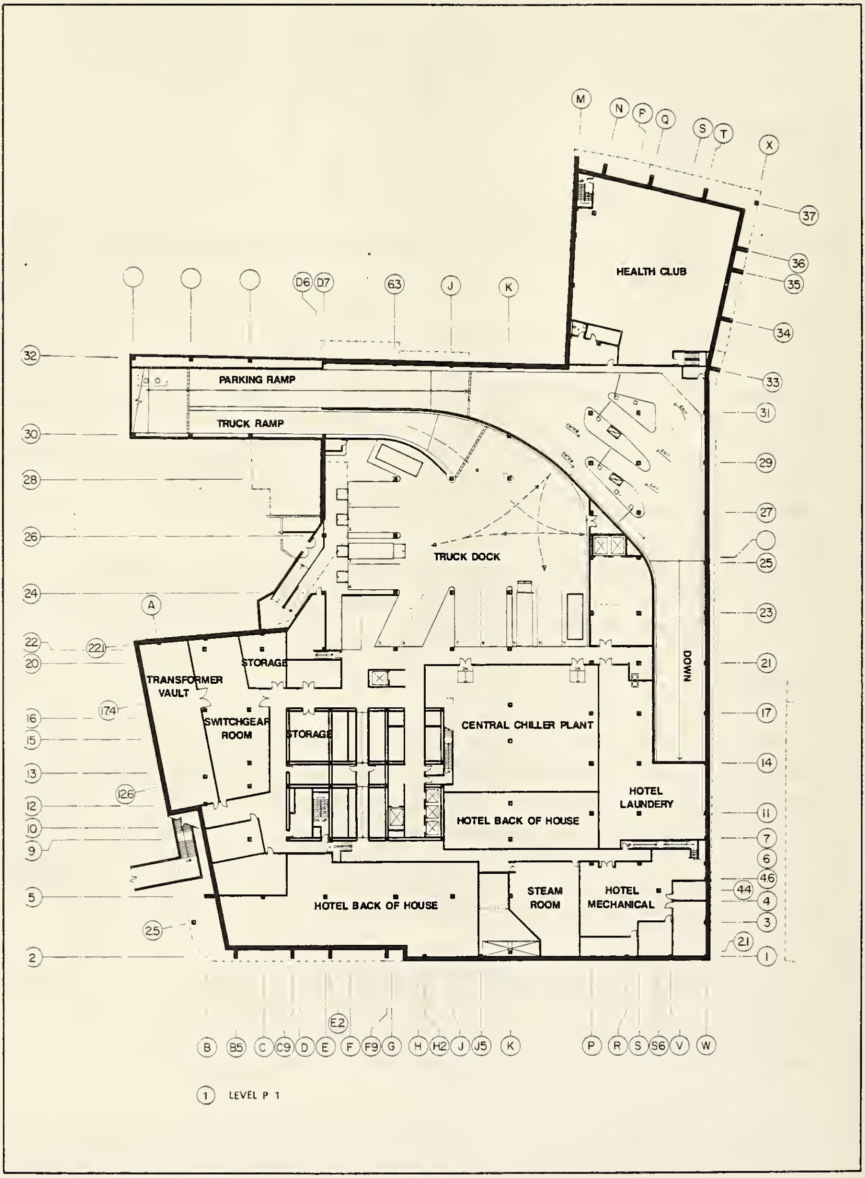


Figure 18. Parcel 30- Level P1

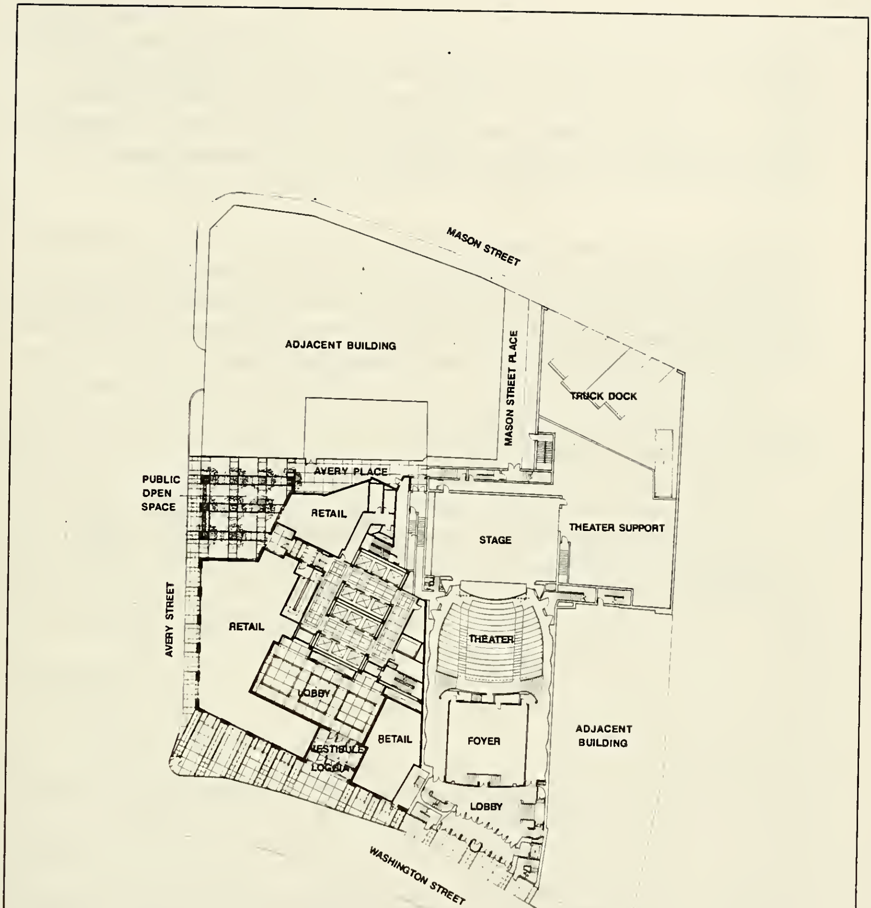


Figure 19. Keith Block Ground Floor Plan

Estimates of the daily truck and service deliveries to the Proposed Project have been made, according to information contained in the Institute of Transportation Engineers' Transportation and Traffic Engineering Handbook (Second Edition, 1982). Truck trip generation for office, retail and hotel uses within the Proposed Project, and resulting truck trips on a daily and peak hour basis are presented in Table 13.

From three projects recently completed in downtown Boston and one nearing completion, typical ratios of building area to loading docks range higher on the average than the Time Saver Standards, falling between 1/104,000 s.f. and 1/170,000 s.f.. The Proposed Project, at 1/147,000 s.f. for the Keith Block and 1/109,000 s.f. for Parcel 30 is within the range of these existing truck dock ratios.

Table 13: Proposed Project Truck Trips

	Truck Rate (Truck Stops/KGSF)	Total Daily Trucks	Peak Hour Trucks (20% of Daily)
PARCEL 30			
Office	.20	166	33
Hotel	.10	29	6
Retail	.25	38	8
Subtotal		**233**	**47**
KEITH BLOCK			
Office	.20	129	26
Retail	.25	3	1
Theaters	NA	NA	NA
Subtotal		132	27
Total		365	74

As Table 13 displays, the Proposed Project is projected to generate a total of 365 truck trips on a daily basis, and approximately 74 trips during either peak hour.

Comment #14:

Topic: Transportation

Comment: Provide more detail on the proposed number of parking spaces designated for each use, and the phasing of the construction and use of these spaces relative to the rest of the project.

Response:

A total of 1,000 parking spaces are to be provided within the Proposed Project's parking garage in the Parcel 30 block, to be constructed during the first phase of the project. The proposed designated uses of these spaces is 600 spaces reserved for office tenants, 59 spaces reserved for hotel guests, and 341 spaces reserved for visitors and retail patrons. No parking spaces are to be located within the Keith Block component of the development due to the site's geometric configuration (see Figures 20 and 21) which precludes incorporation of subsurface spaces except at significant premium construction costs . Of the 600 spaces designated for office areas, 460 would be allocated to the Phase I office building, for a ratio of 1 space for every 1,800 sq. ft. of office area. This ratio is consistent with competitive office projects in Downtown Boston. the remaining 140 spaces would be reserved for the Phase II office building on the Keith Block.

Comment #15:

Topic: Transportation

Comment: Provide the basis for the need for parking spaces.

Response:

The proposed 1,000 parking spaces are necessary to meet the parking needs of office tenants, hotel guests, and visitors and other patrons of the Proposed Project. The proposed spaces have not been planned to meet the entire parking needs of the Proposed Project, as the proponent is committed to the encouragement of public transportation access of the project. MBTA access is available from the Orange Line on the site, from the Green Line adjacent to the site at Tremont Street and from the Red Line four blocks from the site at downtown Crossing and Park Street Station. Together with the Proponent of the Boston Crossing and One Lincoln Street developments, the proponent is in the process of organizing a Transportation Management Organization through which common transportation concerns may be addressed such as the promotion of public transportation, ridesharing, and the implementation of staggered work hours among office tenant employees. The

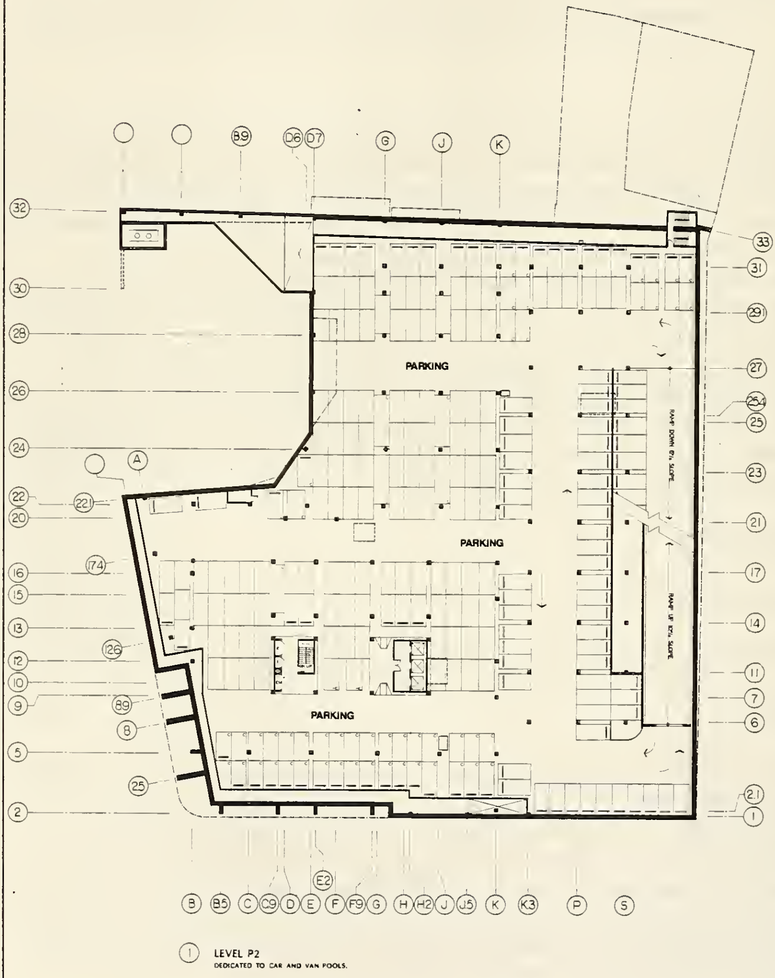


Figure 20. Parcel 30- Parking Level P2

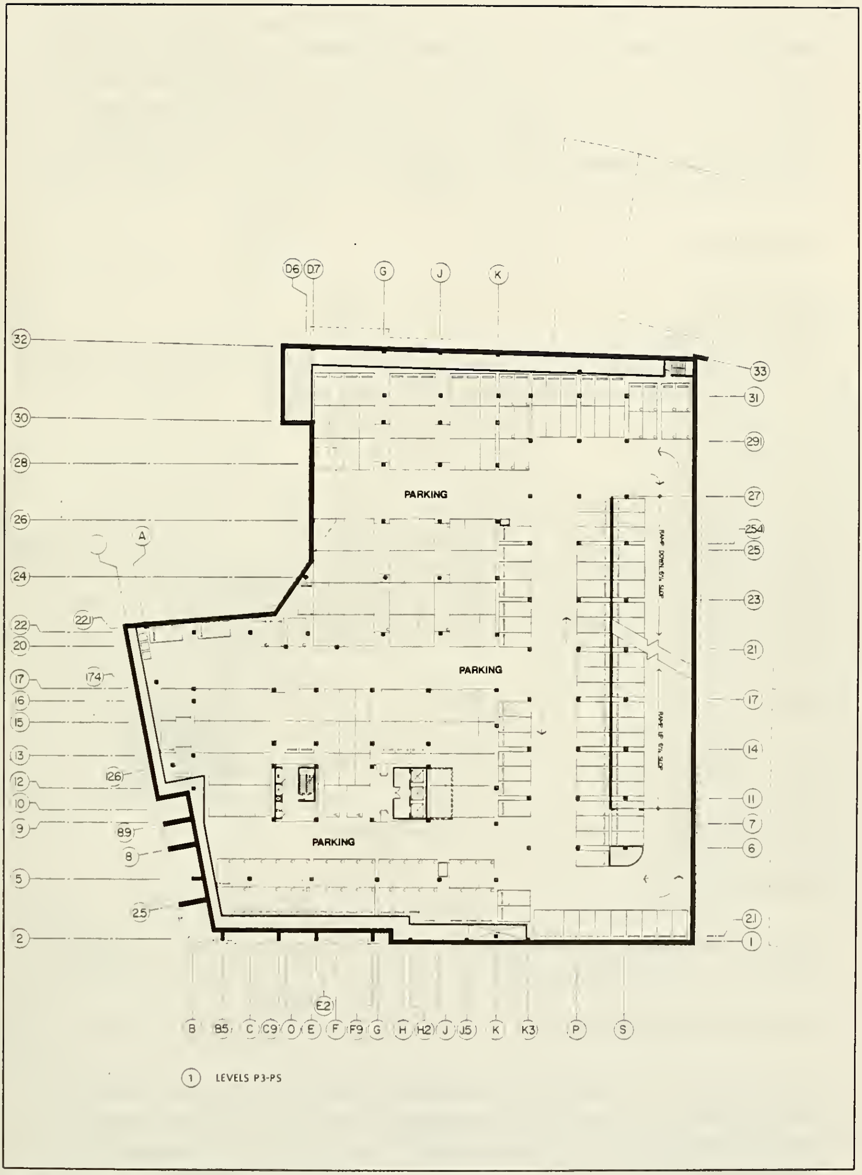


Figure 21. Parcel 30- Parking Levels (P3-P5)

proposed 1,000 parking spaces will serve to satisfy residual demand for parking among those for whom public transportation is unable to provide efficient access to the site as well as providing a sufficient market induced ratio of parking spaces to Project Program area to be competetive with existing and planned commercial projects in the Downtown. With the exception of the spaces reserved for hotel guests, all parking spaces are to be made available in the evening and on weekends to patrons of the Midtown Cultural District.

Comment #16:

Topic: Wind

Comment: Include maps indicating sensor locations, wind speed data, and changes in wind speeds caused by the Proposed Project.

Response:

Figures 22 and 23 represent maps of sensor locations with the 1% annual gust velocities and the 1% annual mean velocities, respectively. The shaded velocities in Figure 22 highlight the sensor locations which exceed the BRA's 31 MPH guideline. Figures 22 and 23 represent the analysis results of the DPIR/DEIR design. Maps with velocities representing the amended design are included as Figures 4 and 5 in the Technical Appendix.

Comment #17:

Topic: Wind

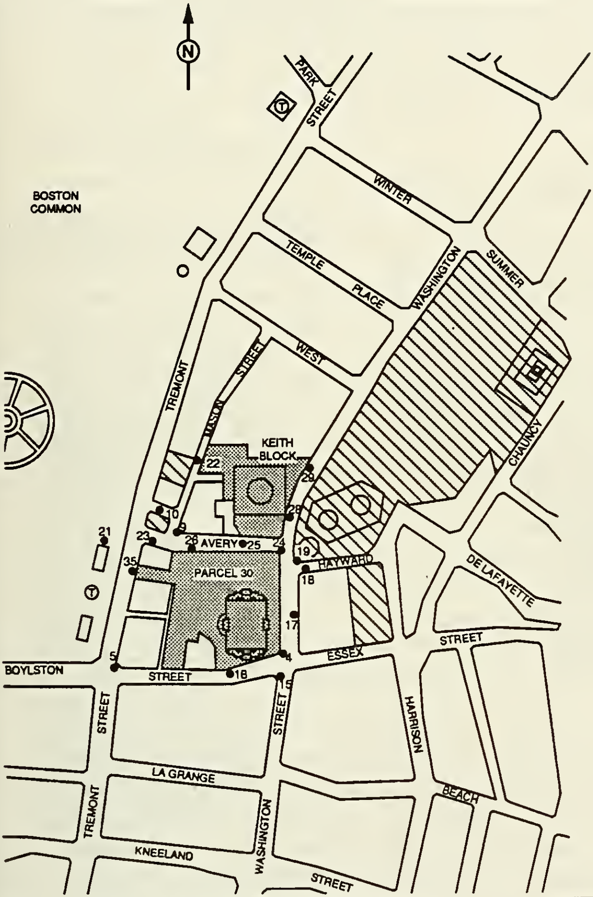
Comment: Provide a seasonal analysis of wind impacts.

Response:

An analysis of seasonal wind impact based on the design presented in the DPIR/ DEIR has been described below.

Tremont Street, DPIR/DEIR

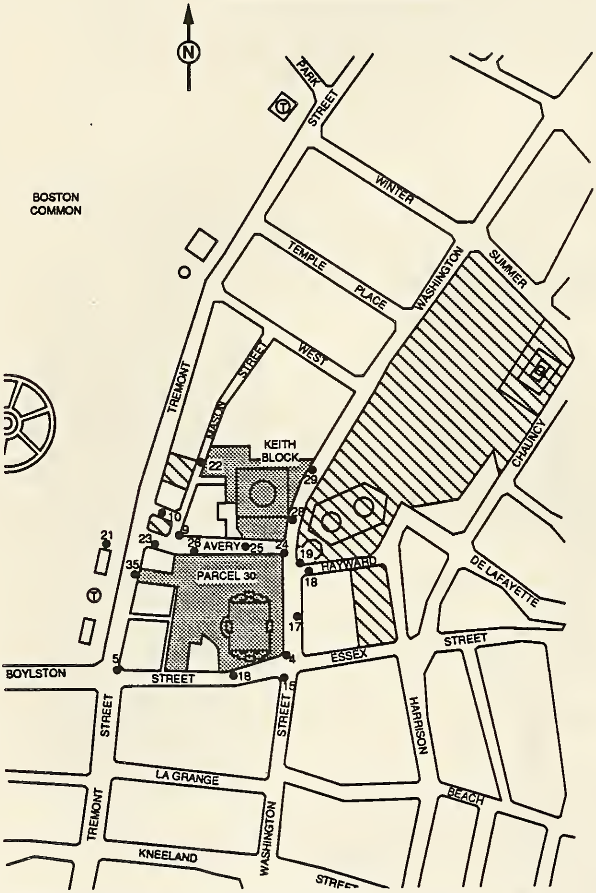
All of the sensor locations that exceed the BRA guideline of 31 MPH 1% annual effective gust velocity are directly attributable to the Tremont-on-the-Common and other building masses along Tremont Street. The following two sections divide Tremont Street into areas north and south of Tremont-on-the-Common.



NB = No-Build Conditions as of 1996
PR = Proposed Project

Point #	Previous Design (mph)		Revised Design (mph)	
	NB	PR	NB	PR
4	7.1	18.8	6.5	22.6
5	25.2	27.3	26.5	25.1
9	13.6	10.6	14.3	11.4
10	26.1	17.7	26.2	19.4
15	8.7	12.4	8.0	14.8
16	8.5	8.7	7.9	9.6
17	14.0	18.7	16.0	22.6
18	13.1	8.9	9.6	8.6
19	19.7	19.0	19.6	16.7
21	9.9	11.9	10.6	13.6
22	8.5	16.7	7.8	8.1
23	17.0	21.1	22.7	21.1
24	14.4	17.8	11.8	17.1
25	16.8	19.6	19.9	17.4
26	13.3	13.3	19.1	14.9
28	15.7	13.7	18.4	15.8
29	12.6	13.5	17.4	17.7
35	19.4	17.5	18.8	15.9

Figure 22. Sensor Locations with 1% Mean Velocity Values



NB = No-Build Conditions as of 1996
PR = Proposed Project

Bold = Exceeds BRA criterion for acceptability limit of pedestrian of 31 mph effective gust velocity 1% of the time on an annual basis

Point #	Previous Design (mph)		Revised Design (mph)	
	NB	PR	NB	PR
4	13.5	25.2	12.1	29.8
5	**31.7**	**35.1**	**32.4**	**31.3**
9	23.2	17.0	24.4	18.5
10	**35.9**	27.5	**35.3**	27.5
15	14.7	18.5	13.6	20.8
16	14.5	15.8	13.5	16.5
17	20.8	27.4	21.6	29.9
18	21.7	14.7	15.4	13.9
19	26.5	26.7	24.9	23.3
21	16.4	19.7	16.2	20.8
22	14.3	23.8	13.5	13.9
23	25.0	30.3	**32.3**	29.7
24	22.3	25.4	17.7	23.2
25	23.6	27.6	27.4	25.3
26	22.5	21.3	26.7	23.4
28	23.6	21.6	24.9	21.9
29	19.0	20.3	24.3	24.6
35	28.9	26.1	27.1	24.1

Figure 23. Sensor Locations with 1% Gust Velocity Values

North of Tremont-on-the-Common to Temple Place, DPIR/DEIR

This area is one of the windiest in Boston and remains virtually unchanged by any of the modifications. The strongest winds will occur during the spring months caused by prevailing southwest winds. Peak seasonal gust velocities range from 35.5 mph to 39.2 mph for the Proposed Project, 34.9 mph to 38.9 mph for the No-Build Condition, and 36.2 mph to 40.6 mph for the Existing Condition. All locations directly north of Tremont-on-the-Common are unsuitable for pedestrian activities for each condition.

South of Tremont-on-the-Common to Boylston Street, DPIR/DEIR

Northwest winds cause flow deflected off Tremont-On-The -Common (TOC) to be directed along Tremont Street, resulting in accelerated wind speeds. The strong lateral wind component travels along Tremont Street accelerating into relief "slots" in the form of crosss streets such as Avery Street. As a result, the strongest winds will occur during the winter months and near the intersections of Avery Street, Mason Place and Boylston Street. For each condition tested, the areas away from these "hot" spot intersections are suitable for pedestrian activities, including street and arcade shopping areas, except the region directly west of TOC which exceeds the BRA's 31 mph guideline by 0.3 mph to 3.2 mph during the winter months.

For the existing conditions, sensor location intersection of Mason Place and Tremont Street results in a maximum seasonal gust velocity 1.0 mph lower than the BRA's guideline and is barely suitable for pedestrian activities such as walking and arcade shopping. At the intersection of Avery Street, the same wind condition as that of Mason Place exists. At the corner of Tremont and Boylston Streets, the winter winds cause wind speeds slightly in excess of the BRA's 31 mph guideline.

For the No-Build condition, the intersection of Mason Place and Tremont Street recorded increases in the maximum seasonal gust velocity to 8.6 mph higher than the BRA's guideline and becomes unsuitable for all pedestrian activities. At the Avery Street intersection, the peak 1% seasonal gust velocity is reduced to 26.9 mph and is suitable for pedestrian activities. The wind speeds around the corner of Boylston Street and Tremont Street were recorded at 31.7 mph 1% gust velocities annually to a maximum of 33.9 mph 1% gust velocity during the winter months. Blockage of some relief "slots" along Tremont Street due to the Parkside projects redirects and accelerates the flow into the remaining relief "slots".

For the Proposed Project, peak seasonal 1% gust velocity at the intersection of Mason Place and Tremont Street was lower than the BRA's guideline by 1.5 mph and is barely suitable for pedestrian activities such as walking and arcade shopping. AT the Avery Street intersection, the peak seasonal 1% gust velocity increased to

32.2 mph, higher than the 31 mph BRA guideline, although the annual 1% gust velocity remains lower than this guideline. The most significant increase in velocity occurs at the corner of Tremont Street and Boylston Street where the 1% annual gust velocity reaches 35.1 mph and 1% seasonal gust velocity peaks at 37.2 mph during the winter. A very uncomfortable wind climate exists at the Boylston and Tremont intersection and is unsuitable for all pedestrian activities.

Boston Common, DPIR/DEIR

Additional wind impact on the Boston Common from the Proposed Project Build scenario and the No-Build condition is minimal. Existing wind impacts are generated by a powerful vortex created by the interaction of northwest and southwest winds with Tremont-on-the-Common, and cause locations directly across the street to experience high-speed winds. Locations north of Tremont-on-the-Common will experience the strongest winds during the spring months and locations south of Tremont-on-the-Common will "feel" higher speeds winds during the winter months. Sensor locations 27 and 8 (see Figure 22), record peak seasonal 1% gust velocities above the BRA's 31 mph guideline for all conditions, ranging from 31.3 mph to 36.2 mph. All other areas within the Boston Common are suitable for pedestrian activities, including open plaza activities such as strolling. During the summer months, these areas of the Boston Common will be suitable for park sitting and open-air restaurants.

Washington Street, DPIR/DEIR

With the DPIR/DEIR design, the windiest area along Washington Street will be from Essex Street to south of the Boston Opera Company (sensor locations 4, 17, 19, 20, 24, 28 and 29). For the proposed project, the strongest winds will occur from the southwest and north-northwest for the area between Essex Street and Hayward Place (locations 4, 17, and 20), resulting in peak 1% annual gust velocities of 26.7, 29.1, 23.0 mph, respectively, during the winter and fall months, whereas the No-Build recorded peak 1% gust velocities of 14.4, 22.6, and 20.5 mph during the winter months. Wind comfort levels are suitable for pedestrian activities for both cases.

The wind environment in the region near the intersection of Washington Street and Avery Street (sensors 19 and 24) is dominated by strong north-northwest and southeast winds. For the proposed project, the peak seasonal gust velocities will occur during the winter months with speeds measuring 28.4 and 27.6 mph for locations 19 and 24, respectively. For the No-Build condition, location 19 recorded a peak 1% seasonal gust velocity of 24.0 mph during the spring months. For sensor locations 28 and 29, the peak 1% gust velocities reached 23.8 mph during the Fall and 21.3 during the winter for the proposed conditions, as compared to 25.1 mph and

20.5 mph for the No-Build conditions during the spring and winter months, respectively. This area remains suitable for pedestrian activities, including strolling and arcade shopping areas for the No-Build and Proposed Project.

Keith Block and Parcel 30, DPIR/DEIR

The wind climate in this area is dictated by winds blowing across the Boston Common, those deflected downward by tall buildings, and flow channeling along Washington Street. Along the perimeter of these blocks, the BRA's 31 mph guidelines was exceeded once on the annual basis and three times on the seasonal basis for the existing conditions, one time annually and twice seasonally for the No-Build conditions and once annually and once seasonally for the Proposed Project.

Along Boylston Street, from Tremont Street to Washington Street, the strongest winds will exist at the intersections with Tremont and Washington Streets. For the Proposed Project, frequently-occurring northwest and less frequent south-southeast winds cause 1% seasonal velocities of 35.1 mph at the Tremont Street corner during the winter months. At the Washington Street corner, southwest winds produce a less severe wind environment with the maximum 1% seasonal gust velocity reaching 26.7 mph and is suitable for pedestrian activities.

For all conditions and seasons, the open plaza adjacent to Parcel 30 will remain suitable for pedestrian activities, including strolling and sitting.

From the Avery Hotel to the Paramount Theater the peak velocities were recorded for southeast and northern winds with the most pronounced peaks developed by the southeast winds. Analysis of this area is covered in the Washington Street section.

Along Avery Street (sensors 9, 25, and 26), the wind confort levels are improved for each of the modified configurations. The strongest pedestrian-level winds develop with the prevailing winds from the western sectors (winter winds) due to reasons previously described in the Tremont Street section. For the Proposed Project, the maximum 1% seasonal gust velocity was measured at 29.9 mph, 23.0 mph, and 18.0 mph for sensor locations 9, 25, and 26, respectively, whereas the No-Build Condition resulted in 25.1 mph, 24.3, 25.2 mph maximum 1% gust velocity during the winter months. Away from the Tremont Street intersection, the area remains suitable for pedestrian activities for each tested scenario except the existing conditions.

Along Mason Street, the presence of the proposed Parkside East building transforms the wind climate behind Tremont-On-The -Common from potentially severe conditions to a comfortable wind environment. Sensor 22 measured at peak 1% seasonal gust velocity of 38.7 mph, well above the standard set by the BRA of 31 mph, for the existing conditions without Parkside East. At the same location, with

Parkside East, the peak 1% seasonal gust velocity measured 16.6 mph (Fall) for the No-Build Condition and 25.2 mph (Spring) for the Proposed Project, both suitable for pedestrian activities.

Comment #18:

Topic: Wind

Comment: Explain discrepancy between the wind results obtained from Commonwealth Center and Boston Crossing.

Response:

The inconsistencies in the Commonwealth Center and Boston Crossing DPIR's/ DEIR's area direct result of changes in building designs between the testing periods. In the Commonwealth Center DPIR/DEIR, the model used for the Boston Crossing project represented the design shown in the Project Notification Form, submitted for the Boston Crossing project. For the Boston Crossing DPIR/DEIR, the model was revised to reflect the most current building design. In addition, in the Boston Crossing DPIR/DEIR, the Boylston facade of Parcel 30 of the Commonwealth Center project had been altered to represent the current design of the Commonwealth Center project at the time of submission. The combination of these design changes resulted in significant changes in wind patterns, especially in the area along Washington Street between the Commonwealth Center project and the southern portion of the proposed Boston Crossing project.

Comment #19:

Topic: Wind

Comment: Propose and test mitigation measures that reduce wind levels at the four locations exceeding BRA wind standards to acceptable conditions.

Response:

The sensor locations along Tremont Street and north of Tremont-On-The -Common (TOC) are not directly affected by the Proposed Project; therefore, no mitigation measures are feasible. The wind climate at the corner of Tremont Street and Boylston Street has changed with the amended designs. These changes are detailed in the quantitative analysis of the amended design under the Tremont Street section. Mitigation measures for this corner and two other locations retested are detailed in the quantitative analysis of the amended design.

Comment #20:

Topic: Shadow

Comment: Demonstrate the Proposed Project's and the Boston Crossing Project's joint conformance with the shadow criteria of Article 38.

Response:

Shadow analyses were conducted to test the conformance of the Commonwealth Center and Boston Crossing projects to the zoning criteria established by the Boston Redevelopment Authority (BRA), and incorporated into Article 38 of the Boston Zoning Code.

Based upon these criteria, the key time period which measures the worst case condition is October 21, at 10:00 a.m. This is a result of the effect of daylight savings time on this date, when the sun is actually lower in the sky at this hour, than it is on March 21. After 10:00 a.m., the sun angle is higher, and shadows are shorter.

Computer modeling programs were developed specifically for this project by Sasaki Associates, Inc. to determine shadow effects on the ground plane while taking into account the sloping terrain of the Boston Common. For this reason, a cooperative effort has been undertaken by the Proponent of both Commonwealth Center and Boston Crossing, and the Sasaki model was used for the shadow analyses for both projects.

Solar time was used in calculating the location of the sun for each of the study times using geographical data about Boston (42 N latitude, 71 - 05 W longitude); the day length effects of the elliptical nature of the earth's rotation around the sun; and daylight savings time. Solar time can vary from clock time by up to 30 minutes or more. This data allowed for accurate determination of the altitude and azimuth of the sun for each shadow run of the computer model. (See Volume 2: Technical Appendix, DPIR/DEIR for detailed information on solar time calculations and the altitude and azimuth of the sun for each time of day).

The computer model was prepared to simulate the baseline conditions described in Article 38, and assumes the maximum allowable heights of 125 feet, 130 feet, and 155 feet for non-PDA buildings within the Midtown Cultural District. These maximum heights, and any existing buildings which exceed those heights were used to develop the As-of-Right shadow conditions for October 21 at 10:00 a.m.

Shadows were then projected for the proposed Commonwealth Center and Boston Crossing developments and a net new shadow area delineated.

The total area of net new shadow which would be cast by Commonwealth Center and Boston Crossing, together, is approximately .88 acres, or 38,000 square feet (see Figure 24). This shadow amount is in conformance with Article 38.

Comment #21:

Topic: Daylight

Comment: Analysis views do not correspond with facade sketches.

Response:

Errors in the observation point location map were corrected to address this comment. See Figure 25 for the corrected map.

Comment #22:

Topic: Daylight

Comment: Clarify observation points shown in Figure 89.

Response:

See Figure 25 for the corrected observation point location map.

Comment #23:

Topic: Daylight

Comment: Clarify why views shown for point #4 (80 Mason Street) and #7 (Masonic Building) in Figures 109 and 110 and 115 and 116 change.

Response:

Observation point #11 (not #4) represents a view of 80 Mason Street and Figures 123 and 124 of the DPIR/DEIR show the same views.

Observation point #7 represents a view of three existing buildings including the Masonic Building (see Figure 25). Table 28 of the DPIR/DEIR demonstrates that the daylight obstruction percentage at this view point remains unchanged (87.2%) for the existing conditions, the Enhanced IPOD/Infill Scheme and the Proposed Project.

The facade sketches show a difference between the two alternatives. This difference

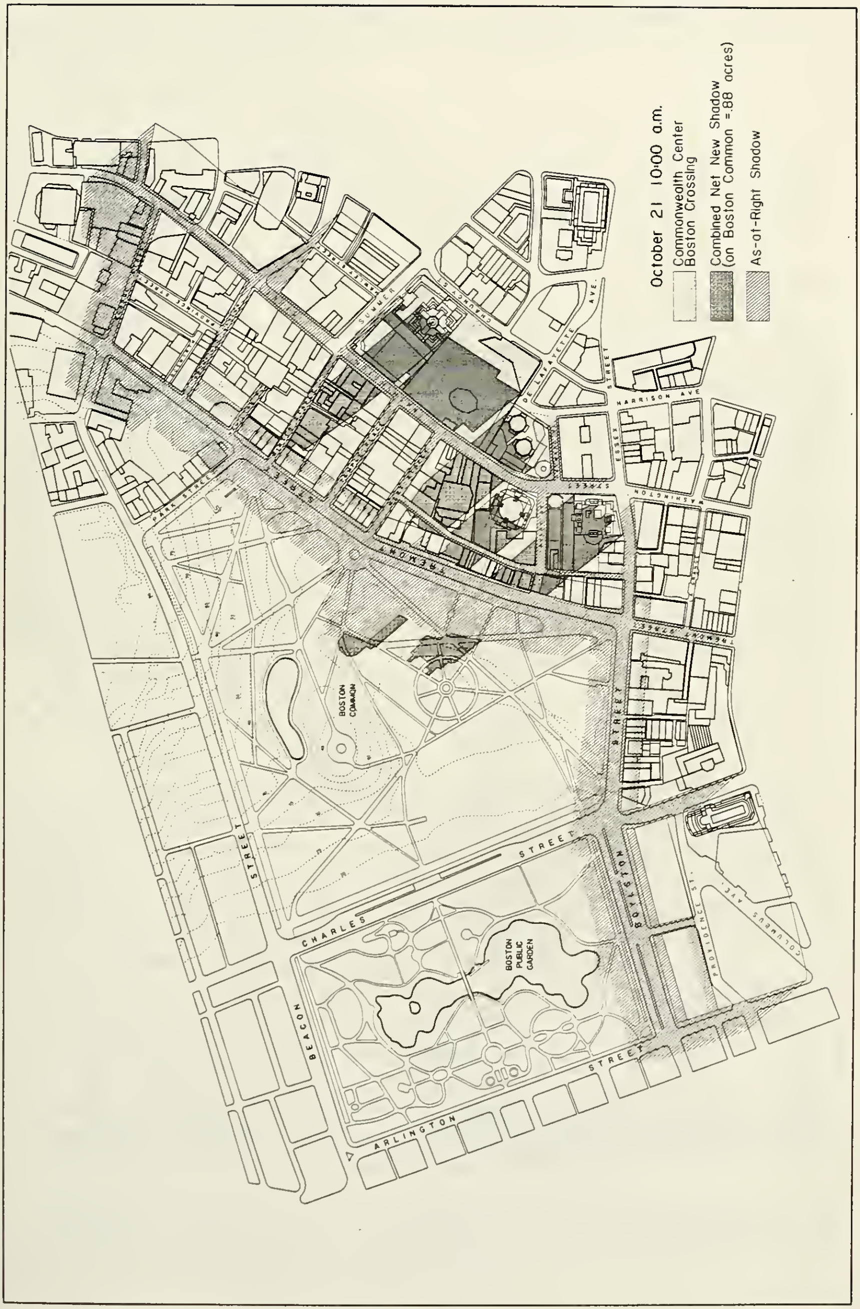


Figure 24 . Shadow Impact-October 21, at 10:00 AM

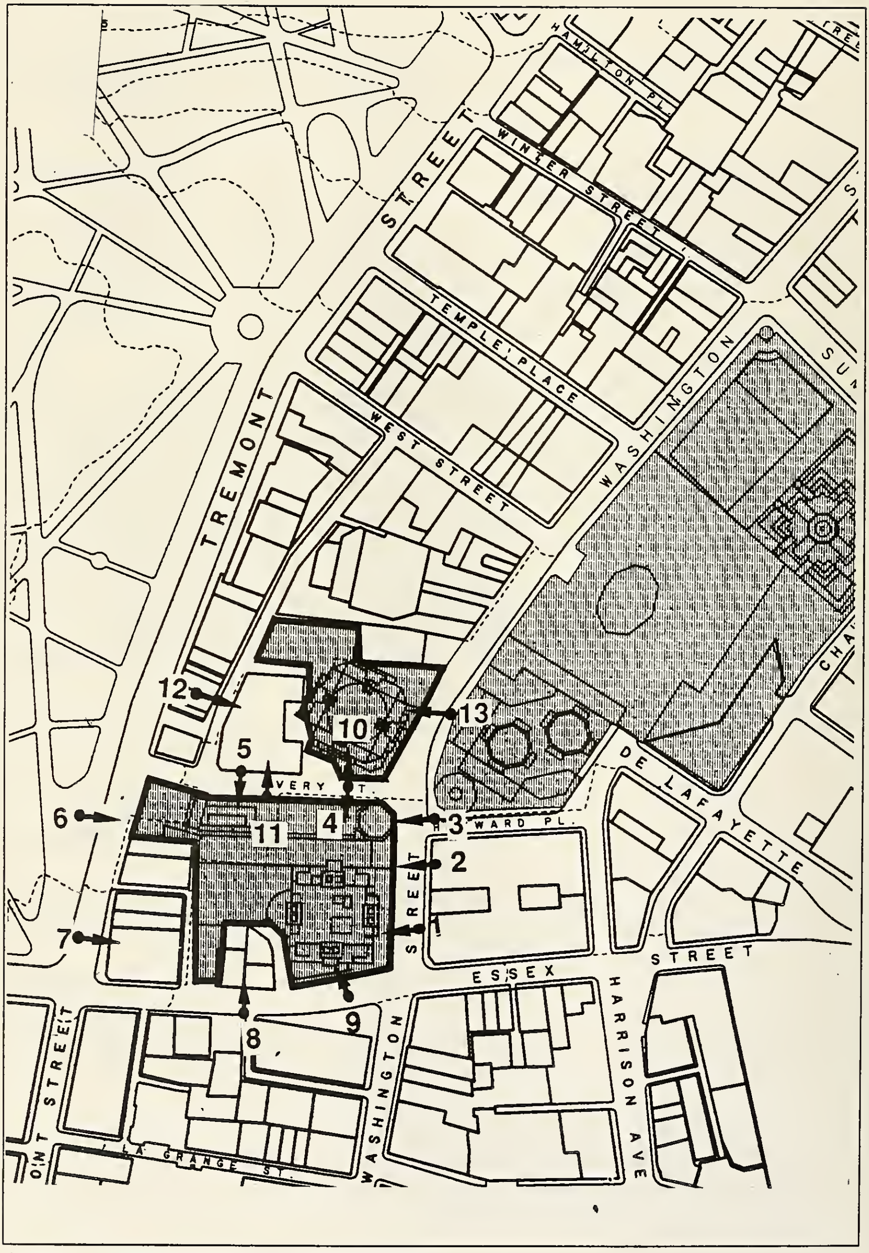


Figure 25. Daylight Observation Point Location Map

exists only in terms of the second layer of analysis which, in this case, does not impact the daylight obstruction percentage.

Comment #24:

Topic: Daylight

Comment: Explain where Appendix "Project Data" sheets for points 6a and 6b are located.

Response:

The BRA Computer Daylight Program (BRADA) indicated a computation error for the Enhanced IPOD/Infill Scheme looking from view point #6. This was due to the building profile input into the program. To compute the obstruction percentage, two view points, 6a and 6b, were designated and an average was calculated for the view point #6.

Comment #25:

Topic: Air Quality

Comment: Explain discrepancies between results of the air quality analysis for Commonwealth Center and Boston Crossing.

Response:

The Boston Crossing future year of analysis was projected for 1995 and Commonwealth Center's was 1996. Traffic volumes for the two reports were based on different circulation patterns as well. The major difference in the two air analyses resulting in discrepancies between the results was the use of different dispersion models which are accepted methodologies by the Massachusetts Department of Environmental Protection. Boston Crossing used CAL3QHC[1], a version of the Federal Highway Administration's Model with enhancements allowing queuing at intersections to be considered. The Commonwealth Center air analysis was based on CALQ3[2]. The Highway Capacity Manual, 1985 was used to determine queuing at intersections. The results of which were input into the CALQ3 program.

Although more work is involved in using the CALQ3 model at signalized intersections, Sasaki Associates, Inc. believes it represents actual field conditions more accurately.

1. *Parsons Brinkerhoff Quade & Douglas, Inc., "CAL3QHC: Modified Version of USEPA's CAL3Q Program", January 1989.*
2. *EPA Region 1, "Calq3 Modeling Procedures", January 3, 1986*

Comment #26:

Topic: Air Quality

Comment: Explain inconsistencies in CO levels between DEP's monitor readings at Washington and Essex Streets and the significantly lower readings predicted in the DPIR/DEIR.

Response:

BRA Air Quality Data Reports prepared by the Massachusetts Department of Environmental Protection, Division of Air Quality Control were reviewed. The last three available years of data (1985-1987) were reviewed for carbon monoxide exceedences. There were no recorded exceedences of the CO standards at any of the monitors throughout the Commonwealth in 1985. In 1986, there were two recorded exceedences of the eight-hour standard at the Essex Street monitor. The exceedences occurred on the same day, March 3rd two hours apart at 2:00 and 4:00 p.m., respectively. Other exceedences occurred in Worcester and Springfield. During 1987 an 8-hour exceedence of the carbon monoxide standard occurred at the monitor located in East Boston and Springfield.

The monitors are sited in specific locations in accordance to EPA siting criteria. The location of each monitor is designed to measure ambient air quality to verify compliance with state and national standards and assess the effectiveness of air pollution control strategies. The sources which contribute to the carbon monoxide monitor are derived from numerous sources such as traffic at the intersection of Washington and Essex Streets and almost a dozen other intersections and traffic on all the major arteries within at least 1,000 feet of the monitor. Additionally, other non-transportation sources such as factory smoke, heating exhaust, cigarette smoke, etc., also contribute to the carbon monoxide concentrations at that monitor. The results of the carbon monoxide monitor is based on region-wide carbon monoxide sources and affected by extreme meteorological conditions (possible inversion).

The microscale carbon monoxide analysis focuses exclusively on the impacts associated with traffic generated by the project. Because carbon monoxide is highest at lower travel speeds, analyses are usually focused on intersections where slow moving or idling vehicle contribute to a higher carbon monoxide concentration than free flow traffic between intersections. The results of the microscale analysis are site specific and based on average "worst case" assumptions.

The results of the analysis indicate that most of peak hour traffic at intersections near the project do not result in adverse air quality.

Comment #27:

Topic: Air Quality

Comment: Explain why the worst case wind direction generally changes at each receptor location for the different analysis years.

Response:

Under the different conditions (i.e., existing 1989, No-Build 1996 and Build 1996) there are significant changes in traffic volumes for the roadway segments which make up an intersection. For instance, a particular quadrant of an intersection may become more congested under future Build conditions due to the influence of traffic generated by the project. As the traffic changes within an intersection, different wind angles will reflect the "worst case" or highest carbon monoxide concentration.

Comment #28:

Topic: Air Quality

Comment: Analyze impacts of proposed retiming of the signal at Park and Tremont Streets on pedestrian Level of Service.

Response:

In response to the memorandum from Gary Idleburg of DEP (formerly Department of Environmental Quality Engineering) dated July 10, 1989, the intersection of Tremont and Park Streets has been reanalyzed. Originally, the analysis presented in the Draft document was conservatively analyzed by assuming that the vehicles on Tremont Street north of the intersection back up during the signal red time only in one lane. However, the vehicle queue for the through movement is spread into two, 12-foot travel lanes. This condition was analyzed for 1996 Build one and eight hour conditions. This further refinement to the air analysis shows compliance with the National Ambient Air Quality Standards. The data input and output for the 1996 Build one and eight hour conditions are presented in the air quality section of the technical appendix. It should be noted, also, that there was an adjustment made to the build trips generated by the Commonwealth Center also reflected in this analysis.

The pedestrian phase was not changed in the present analysis due to the lower levels of CO. Therefore, pedestrian levels of Service at the intersection of Tremont and Park Streets will be the same as presented in the DPIR/DEIR.

Comment #29:

Topic: Air Quality

Comment: Analyze the Project's impacts to tropospheric (ground-level) ozone on a regional scale, as requested by the Conservation Law Foundation.

Response:

The Commonwealth of Massachusetts presently shows exceedences of the National Ambient Air Quality Standards for ozone. Ozone is formed in the atmosphere when non-methane organic compounds (NMOC) and nitrogen oxide (NOx) emissions from motor vehicle exhaust, stationary source fuel combustion and industrial processes react in the presence of sunlight. Due to the highly complex chemical reactions and numerous pollutant sources which contribute to the formation of ozone, it is almost impossible to study one project's contribution to the regional burden of ozone.

However, at the request of the Boston Redevelopment Authority in response to concerns from the Conservation Law Foundation, a mesoscale analysis was required to test the project's impact on the regional burden of ozone. The analysis was conducted for 1995 Build and No-Build conditions for the six major roadway corridors within Boston. The results of the analysis are expressed in Tons per Year for the pollutant precursors of ozone which are non-methane hydrocarbons and nitrous oxides and are presented in the air quality section of the technical appendix.

The results of the analysis indicate that the contribution of the Proposed Project's traffic on the major roadway corridors will result in a less than one percent increase on the regional burden of non-methane hydrocarbons and nitrous oxides.

Comment #30:

Topic: Geotechnical

Comment: Discuss requirements of the Boston Water and Sewer Commission for a permit to discharge groundwater or pore water in the city's storm drainage system.

Response:

Temporary Discharge

Some temporary dewatering would be necessary to remove groundwater from within the excavation limits during construction. A permit to discharge groundwater into the City storm drains on a temporary basis will be applied for from the Boston Water and Sewer Commission.

Permanent Discharge

The lowest below-grade (P5) floor slab of the Parcel 30 basement structure will be designed as a slab-on-grade. The hydrostatic pressures at the bottom of the slab will be fully relieved by providing a permanent system for groundwater control. The system will consist of the diaphragm wall acting as a seepage cutoff and an underslab drainage system. Extension of the slurry wall into the glacial deposits will provide an effective seepage cutoff. The underslab drainage system consists of a layer of crushed stone and perforated drain pipe. Pipes will collect the seepage and discharge it to collection sump pits beneath the lowest floor level.

The Boston Water and Sewer Commission prohibits discharge of groundwater into the City storm drains on a permanent basis. Accordingly, studies are currently underway to determine the feasibility of discharging water collected in the underslab drainage system in to the ground by pumping to recharge wells located at the perimeter of the project site. Collected groundwater would be pumped to the top of the well near ground surface and percolate into pervious marine deposit strata below the surficial fill stratum.

Comment #31:

Topic: Solid and Hazardous Waste

Comment: Include a copy of the Chapter 21E site assessment report, as well as the report on the presence of asbestos and PCBs.

Response:

Reference is made to the following studies. These studies are available through the Boston Redevelopment Authority's library.

- The results of the Chapter 21E Site Assessment is contained in a report entitled "Report on Oil and Hazardous Material Site Evaluation, Commonwealth Center, Boston, Massachusetts" prepared by Haley & Aldrich, Inc. dated 13 October 1989; Vol. I & II.

- The results of the asbestos/PCB survey are contained in a report entitled "Survey Report of Asbestos and PCB-Containing Materials, Commonwealth Center Development Site, Boston, Massachusetts" prepared by Hygeia, Inc., dated 31 May 1989; Vol. I & II.

Detailed procedures for handling, testing and disposal of contaminated soil will be outlined in the project specifications and the excavated soil material management plan. These procedures will be implemented if contaminated soil is encountered during excavation.

Comment #32:

Topic: Noise

Comment: Explain why the day/night noise level from autos at the Boston Common is less in the future year than for existing conditions.

Response:

The DNL (Design Noise Level) contribution from autos at the Boston Common for 1989 existing conditions are 70 and 59 decibels from Tremont and Boylston Streets, respectively. These values are lower than the 1996 No -Build and Build conditions. Table 35 of the DPIR/DEIR has been corrected to reflect this condition. See response to comment #38.

Cumulated Design Noise Levels at the Boston Common presently exceed acceptable noise levels due to the high volume of traffic. This condition is anticipated to persist in 1996 with or without the project and is a reflection of high traffic volume inherent with any inner city environment. In this setting it is impractical to achieve any significant noise mitigation.

Comment #33:

Topic: Noise

Comment: Analyze the noise impact from the Project's building mechanical equipment.

Response:

Noise levels within a typical multi-story building are derived from a number of different electrical and mechanical equipment, piping and pumping systems, elevators and escalators.

Some of the typical equipment which generates noise levels in excess of 90 decibels at three feet include air conditioning units, boilers, steam valves, chillers, compressors, pneumatic transport systems, electrical motors, fans, cooling towers, diesel engines, and gas turbines (Bolt, Berenek and Newman, 1971). Most of these types of equipment are hidden from view behind cabinets, ceilings, mechanical equipment rooms, and rooftop mechanical rooms.

Within the Proposed Project complex a major portion of the upper story mechanical equipment will be housed in a penthouse mechanical room thereby removing the noise source from the building tenants. Additionally, heavier weight slab construction and the installation of vibration isolators will protect the tenants on the floors beneath the penthouse. Some of the mechanical equipment will be located on levels 16 to 31 adjacent to the elevator banks. This equipment will be located in mechanical equipment rooms with walls constructed of double sheet rock acoustical baffles on the return air ducts and lining the ductwork with acoustical material to ensure that the adjoining tenant space has a noise criteria of 40-45 which is typical of a multi-story building. The majority of the noisier equipment such as electrical generators, chilling plant, transformer vault, and switch gear room will be located below grade adjacent to the parking garage. In this instance these noise generators will be muffled by the subsurface soils as well as masked by the mobile sources within the garage. The design of the complex has not been developed far enough to identify the number and types of building equipment that will be placed in the identified building equipment locations. However, an acoustical engineer will be hired to identify noise problems and design architectural treatments to ensure that the building will comply with all state and local enforcement codes with regard to noise.

Noise from construction equipment and operations, building equipment, and home appliances. U.S. Environmental Protection Agency, NTID300.1 by Bolt, Berenek and Newman, 1971.

Comment #34:

Topic: Noise

Comment: Correct Table 35 relative to the cumulative DNL for Tremont on the Common.

Response:

All of the data sheets presented in the Appendix have been checked and corrected where appropriate. All corrections have been made to Tables 35, 36 and 37 of the DPIR/DEIR (see response to Comment #38).

Comment #35:

Topic: Noise

Comment: Include worksheets for all intersections in the Appendix.

Response:

Worksheets 1 through 51 are contained in the Appendix and represent the noise analyses at all receptors for existing 1989, No Build 1996 and Build 1996 conditions.

Comment #36:

Topic: Noise

Comment: Correct errors in Appendix worksheets.

Response:

See response to comments #34 and #35.

Comment #37:

Topic: Noise

Comment: Revise Tables 35 and 36 to reflect correct cumulative DNL totals.

Response:

Tables 35 and 36 of the DPIR/DEIR have been changed to reflect corrections to cumulative Design Noise Levels. See corrected tables below.

Comment #38:

Topic: Noise

Comment: Re-submit analysis if above revisions affect the analysis contained in the DPIR/DEIR.

Response:

All data sheets and Tables 35, 36 and 37 of the DPIR/DEIR have been checked, adjustments have been made and included in the FPIR/FEIR as Tables 14, 15, and 16. The criteria for acceptable levels of noise generation is below 65 decibels.

Table 14: Results of the 1989 Existing Conditions Traffic - Related Noise Analysis

Noise Assessment Locations	Contributing Streets	DNL From Auto (dB)	DNL From Truck (dB)	Cumulative DNL (dB)	Criteria
Boston Common	Tremont	70	76		
	Boylston	59	66		
			Total	77	Unacceptable
China Trade Center	Boylston	67	74		
			Total	75	Unacceptable
Touraine Building	Boylston	67	74		
			Total	75	Unacceptable
Retail Store	Washington	66	73		
			Total	74	Normally Unacceptable
Hotel Entrance	Avery	54	60		
			Total	62	Normally Unacceptable
Mason Place	Avery	55	61		
			Total	62	Normally Unacceptable
Parkside West	Tremont	68	75		
			Total	76	Unacceptable
Tremont on the Common	Tremont	68	75		
			Total	76	Unacceptable

Table 15: Results of No-Build (1996) Traffic - Related Noise Analysis

Noise Assessment Locations	Contributing Streets	DNL From Auto (dB)	DNL From Truck (dB)	Cumulative DNL (dB)	Criteria
Boston Common	Tremont	71	79		
	Boylston	61	68		
			Total	80	Unacceptable
China Trade Center	Boylston	69	76		
			Total	77	Unacceptable
Touraine Building	Boylston	69	76		
			Total	77	Unacceptable
Retail Store	Washington	67	75		
			Total	76	Normally Unacceptable
Hotel Entrance	Avery	59	66		
			Total	67	Normally Unacceptable

Mason Place	Avery	60	67		Normally
			Total	68	Unacceptable
Parkside West	Tremont	69	76		
			Total	77	Unacceptable
Tremont on the Common	Tremont	69	76		
			Total	77	Unacceptable

Table 16: Results of Proposed Project Traffic - Related Noise Analysis

Noise Assessment Locations	**Contributing Streets**	**DNL From Auto (dB)**	**DNL From Truck (dB)**	**Cumulative DNL (dB)**	**Criteria**
Boston Common	Tremont	72	80		
	Boylston	61	68		
			Total	81	Unacceptable
China Trade Center	Boylston	70	77		
			Total	78	Unacceptable
Touraine Building	Boylston	70	77		
			Total	78	Unacceptable
Retail Store	Washington	69	75		Normally
			Total	76	Unacceptable
Hotel Entrance	Avery	59	67		Normally
			Total	68	Unacceptable
Mason Place	Avery	60	67		Normally
			Total	68	Unacceptable
Parkside West	Tremont	70	77		
			Total	78	Unacceptable
Tremont on the Common	Tremont	70	77		
			Total	78	Unacceptable

Comment #39:

Topic: Construction

Comment: Assess cumulative impacts of the Proposed Project and other construction projects in the area; propose coordination among various projects.

Response:

Coordination meetings between the Proposed Project construction team and the Boston Crossing construction team have already commenced, and will continue throughout the development of both projects.

From a traffic viewpoint, the most difficult interface is between the Boston Crossing project and One Lincoln Street project because of their close proximity. Meetings with those teams are currently underway.

The construction traffic interface between Boston Crossing and Proposed Project overlaps only along Washington Street, and then only for the one and a half (1 1/2) blocks from Boylston Street northbound. An initial plan for traffic control has been reviewed with the Boston Traffic Department and the routing of traffic, to the Project site via Washington Street and away from the site via Avery to Tremont has been preliminarily agreed upon in principle. This routing was selected because of its negligible impact on the other two projects.

Comment #40:

Topic: Rodent Control

Comment: Revise frequency of rodent control service.

Response:

After the initial treatment prior to demolition, and once construction starts, weekly visits to inspect and treat will be made. These visits will continue to be made until such time as they demonstrate that semi-monthly (two per month) visits are in order. For the duration of construction, inspections will be made twice a month, and will be increased if circumstances so dictate. Dumpsters on the site will be emptied once a week or as often as circumstances warrant during construction.

Comment #41:

Topic: Urban Design - Massing

Comment: Analyze an alternative schematic design for the north tower that minimizes the impact of new shadow on the Boston Common and reduces the width of the building as seen from the Common.

Response:

In response to concerns expressed by the Boston Society of Architects, the Greenspace Alliance, the Friends of the Boston Common and Public Garden and the Boston Redevelopment Authority over the massing and potential adverse environmental effects of the north tower of the Proposed Project, this building has been redesigned to minimize the impact of new shadow on the Boston Common, and to reduce the visual impact of tower width as seen from the Boston Common. Figures 19, 26, 27, 28, 29, and 30 detail the new north tower design for the Keith Block portion of the Project site. The redesigned north tower is a more symmetrical, slender building with smaller floor plates and smaller dimensional widths to each face, and is two stories taller than the original design, although the total program area is approximately 67,750 square feet smaller than the original design. The redesigned tower massing reflected in the FPIR/ FEIR has been reviewed by the Boston Landmarks Commission and has been granted Conceptual Approval (see Technical Appendix).The width of each face of the new tower is 135 feet across, compared to 175 feet of the previous tower as measured at the face fronting the Common. In addition, the rotation of the tower places no face of the tower in the same orthogonal plane with the Parcel 30 tower, minimizing the effect of a "wall" along the Common. Net shadow impacts of the Proposed Project with the new north tower are detailed in the response to Comment #20 and Figure 24. Combined net new shadow area of the Boston Crossing project and the Proposed Project at the key time period is .88 acres which is in conformance with the shadow criteria specified under Article 38 of the Boston Zoning Code. This compares with an approximate combined area of 1.1 acres generated by the previous massing configurations of both projects during the same key time period as presented in their respective DPIR/DEIR's.

A full schematic design submission set of drawings that includes revised massing studies, site sections and perspective renderings of the amended Proposed Project has been submitted to the Boston Redevelopment Authority. A list of these materials appears in the Technical Appendix . Figures 31 through 34 are figures requested by the BRA to be revised for the FPIR/FEIR.

Comment #42

Topic: Urban Design - Massing

Comment: Increase distance between the north and south towers and the distance to the proposed tower at Hayward Place.

Response:

The distance between the redesigned north tower on the Keith Block and the south tower on Parcel 30 has been increased to 158 feet as measured from their closest tower faces above the 125 foot vertical elevation point. In addition, since the north tower face is located at an angle to the closest face of the south tower, the average distance between faces is 174 feet (see Figure 35). These distances compare with a measurement of 152 feet between the south tower and the previous massing configuration of the north tower as presented in the DPIR/DEIR (see Figure 36).

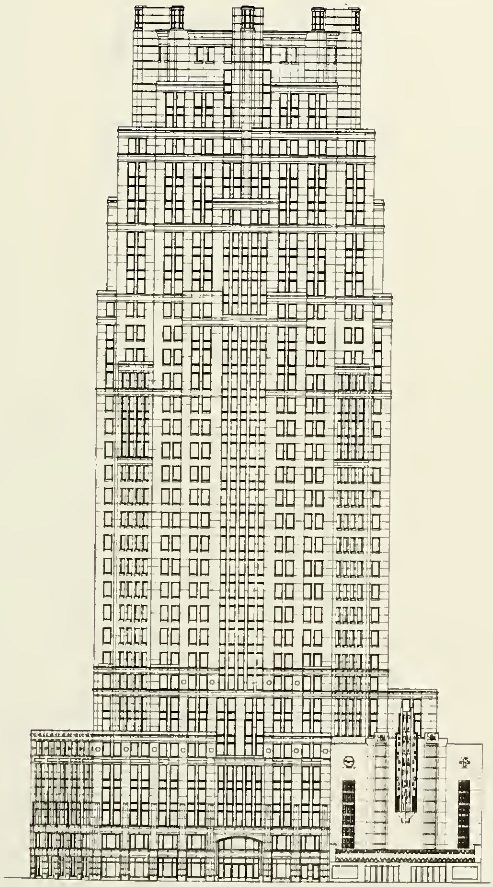


Figure 26. Keith Block-East Elevation

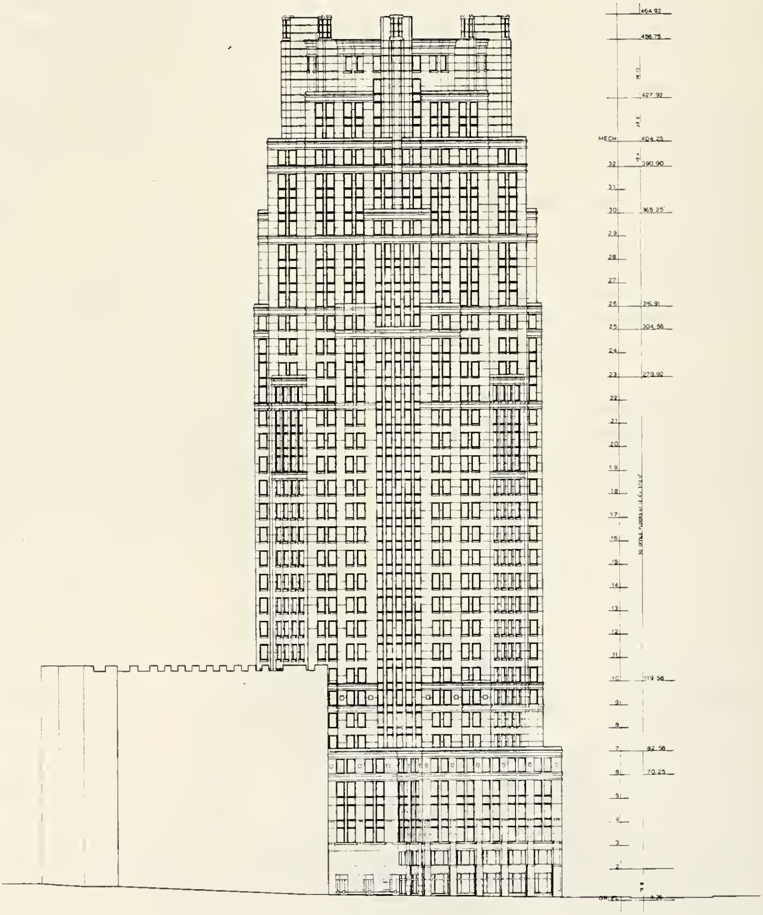


Figure 27. Keith block - South Elevation

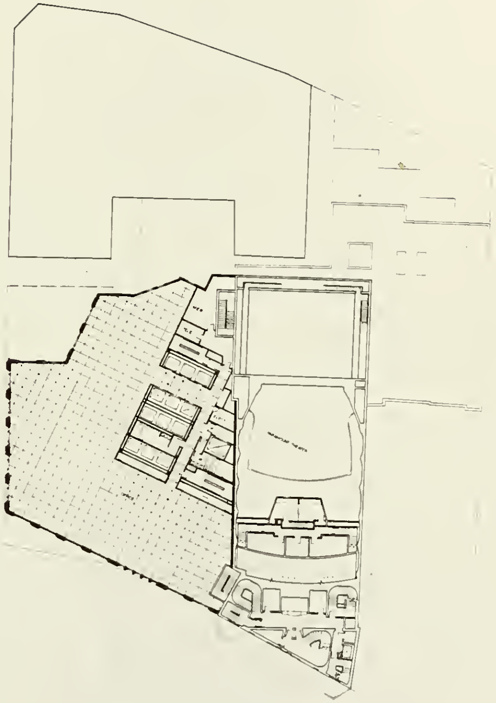
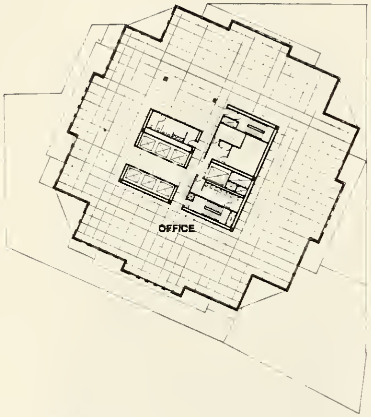
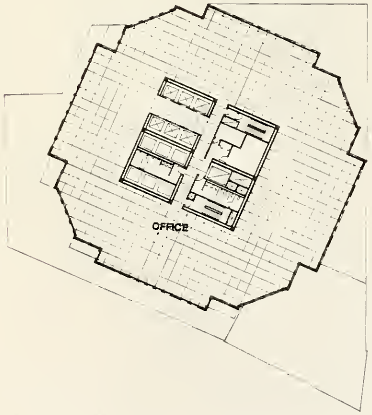


Figure 28. Keith Block- Levels 3-5



② LEVELS 26–29 – TYPICAL HIGHRISE CORE



① LEVELS 10–15 – TYPICAL LOWRISE CORE

Figure 29. Keith Block - Typical Office Level Plans

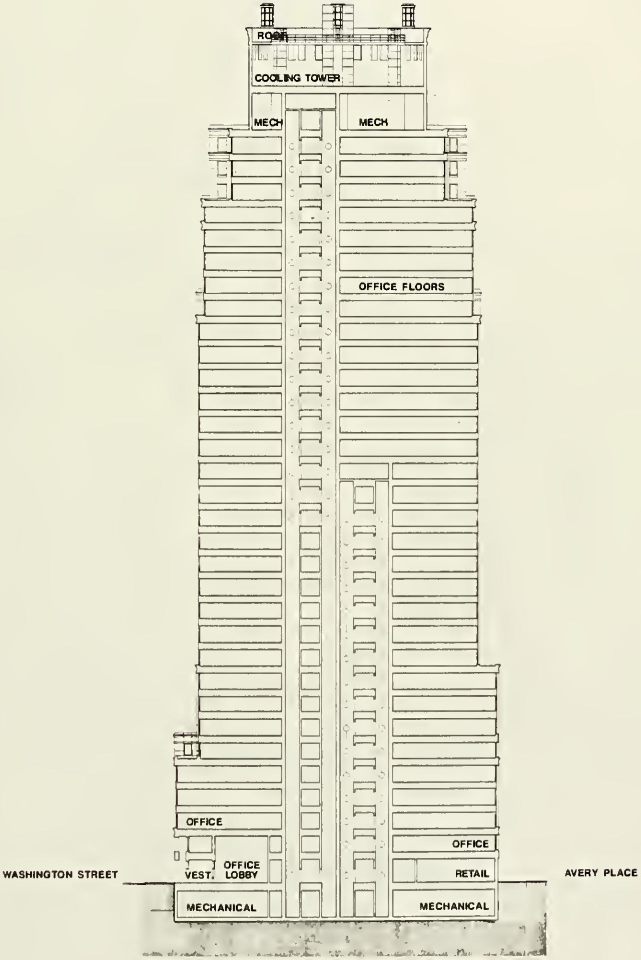


Figure 30. Keith Block - Transverse Section

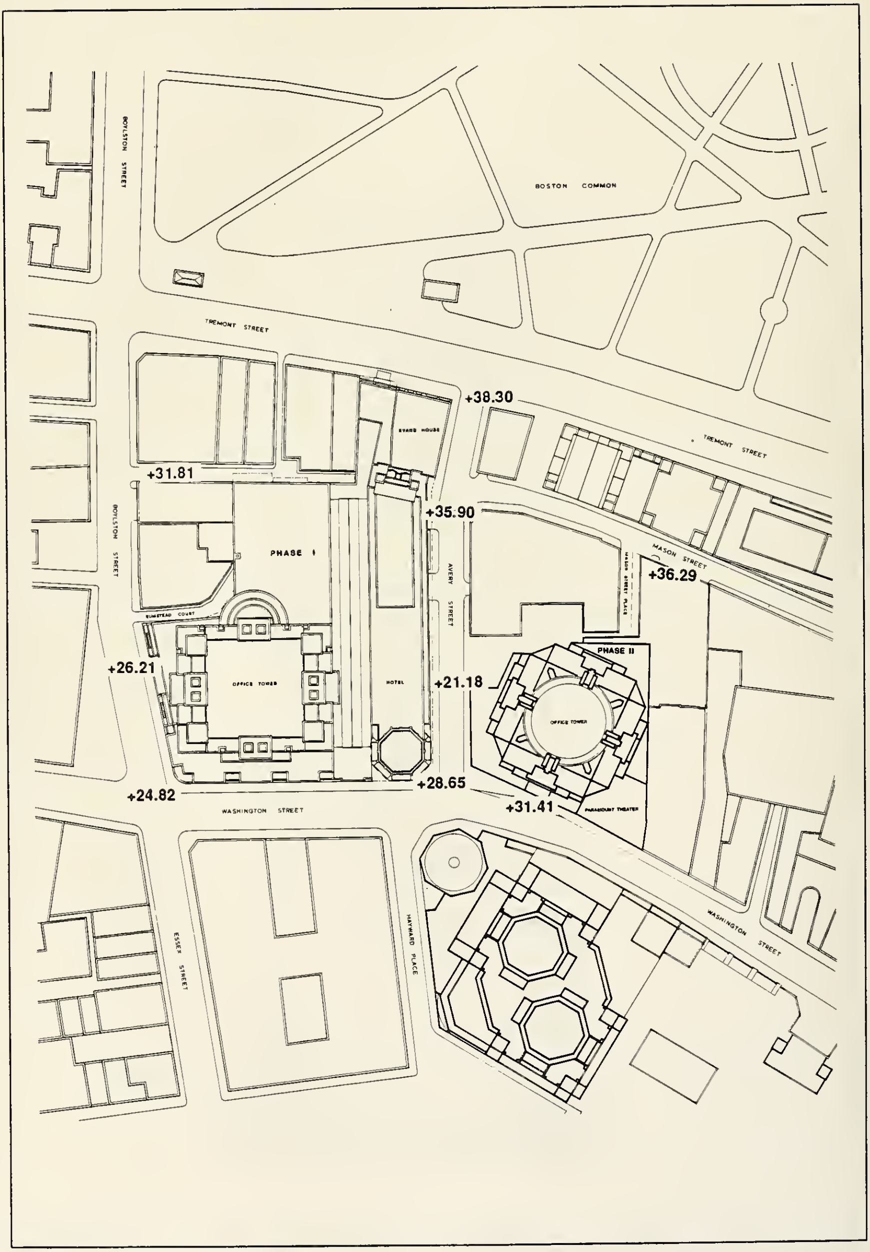
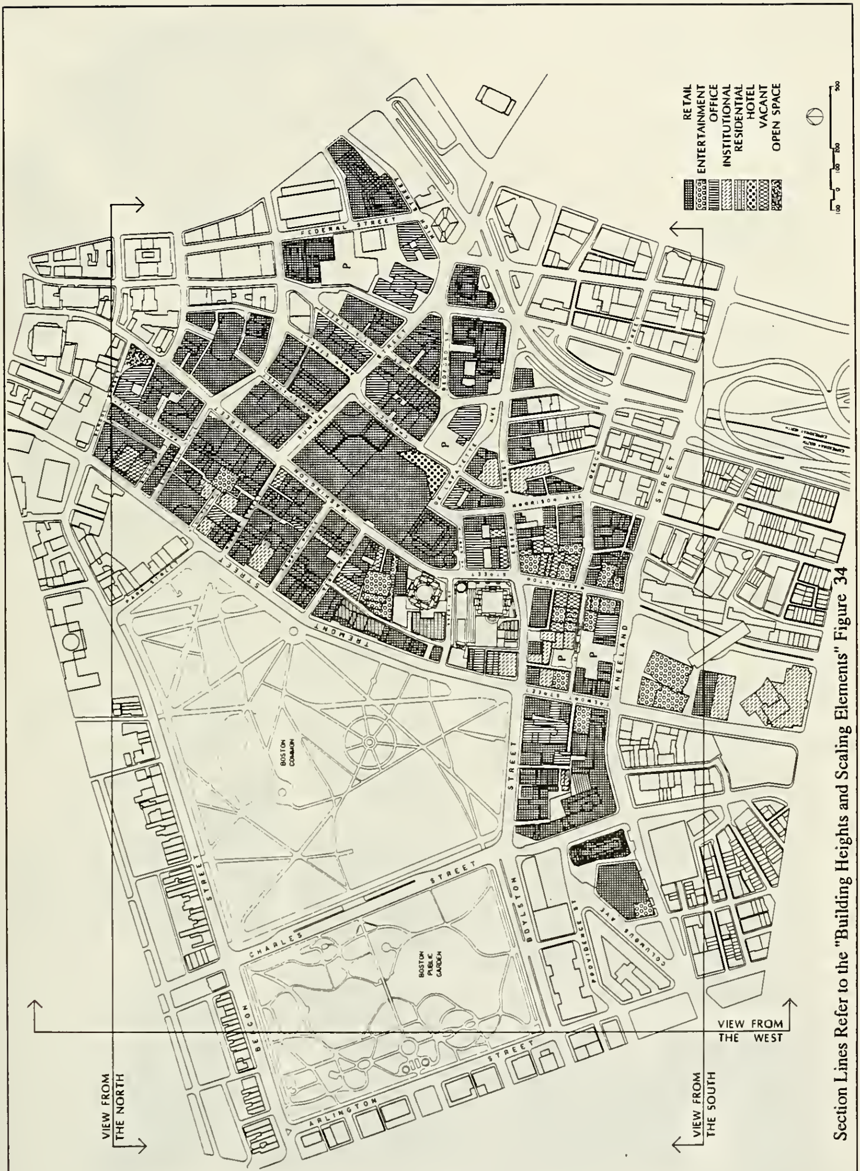


Figure 31. Major Topographic Features



Section Lines Refer to the "Building Heights and Scaling Elements" Figure 34

Figure 32. Land Use

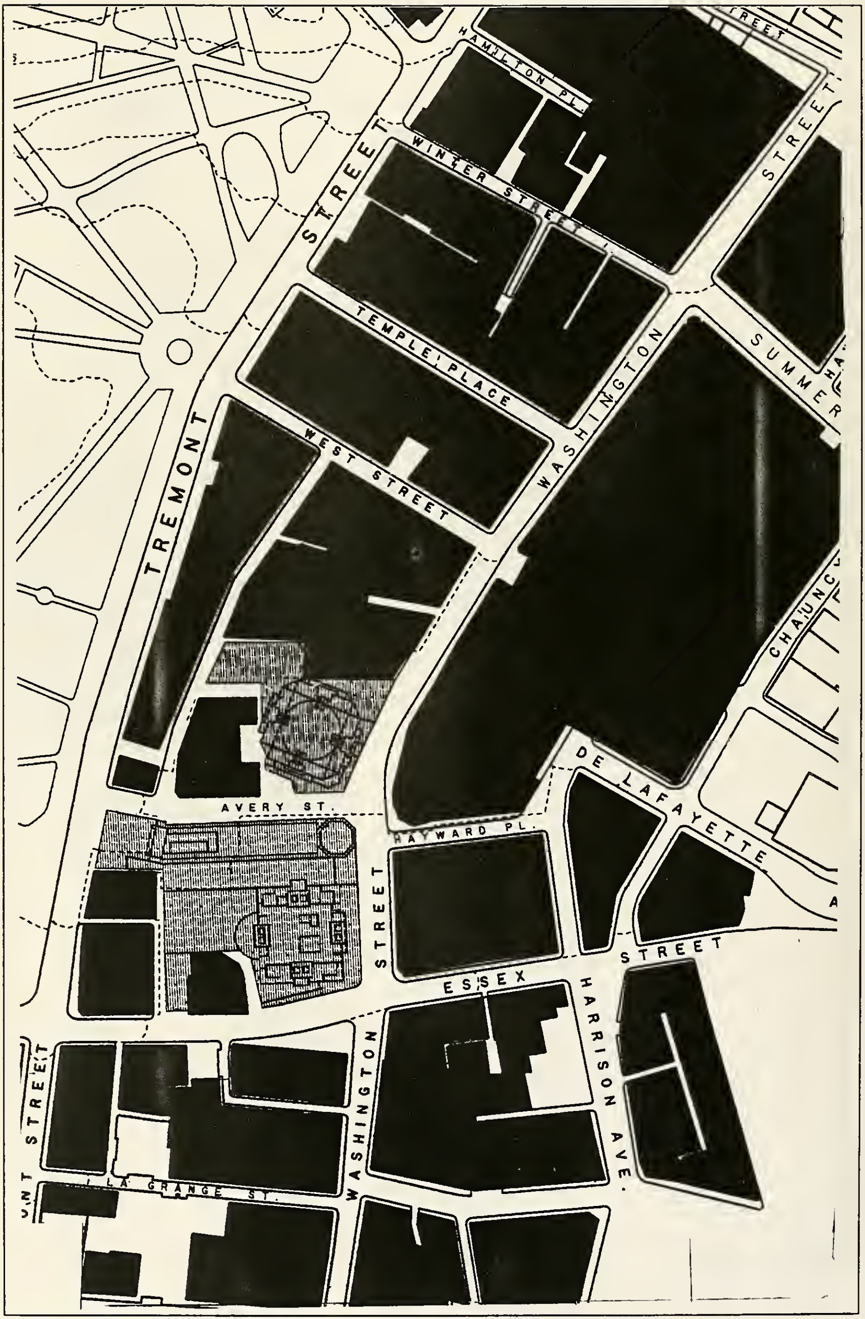


Figure 33. Massing and Open Space

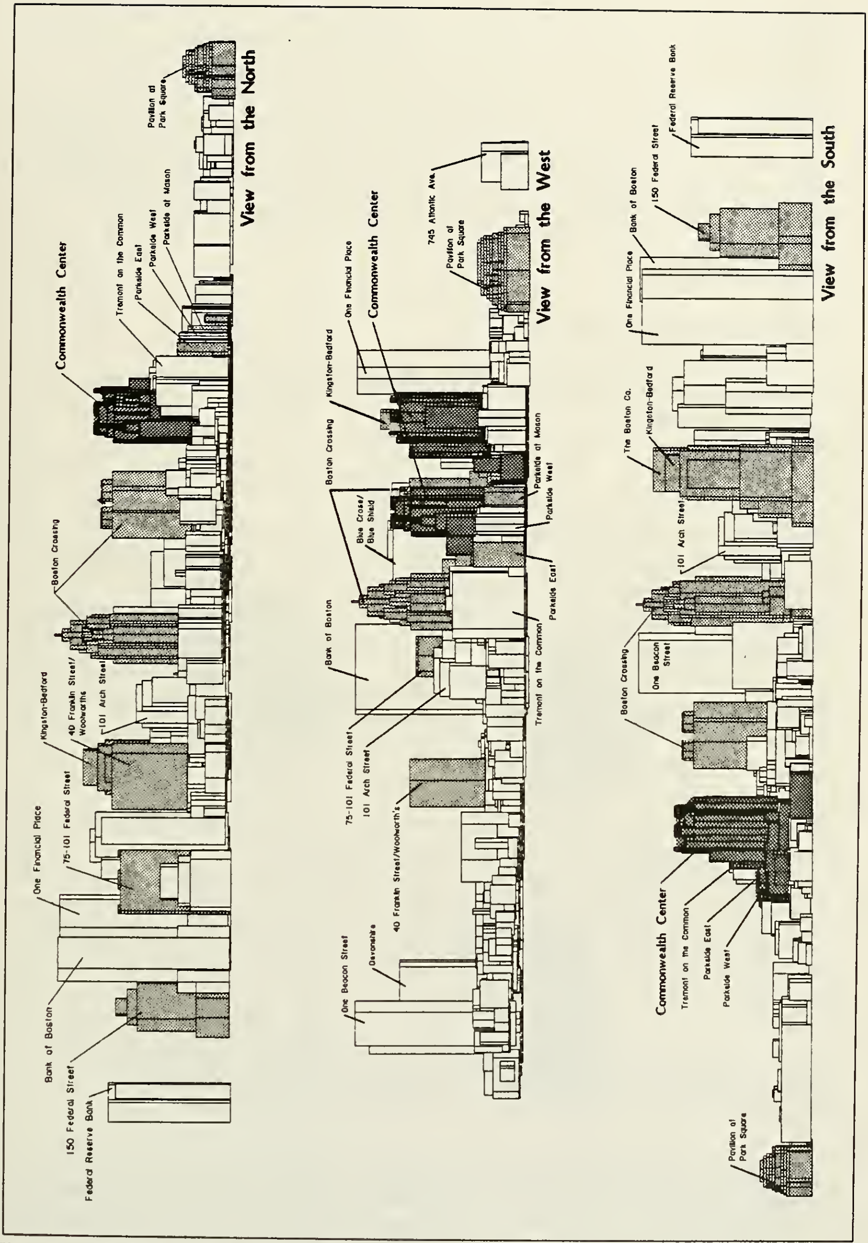


Figure 34. Building Heights and Scaling Elements

In changing the north tower massing to respond to visual and shadow impacts on the Boston Common, the revised configuration places the north tower face (above the 125 foot elevation point) approximately 7.0 feet closer to the property line at Washington Street than the original configuration presented in the DPIR/DEIR. This results in a modest increase in proximity to the proposed Boston Crossing tower at Hayward Place compared to the original north tower design (see Figures 35 and 36). Concerns relative to possible increases in wind velocity from this realignment have been addressed in Chapter II, Comment #16 and in the Technical Appendix.

Comment #43

Topic: Urban Design - Massing

Comment: Investigate refinements to the roof top and massing details of both towers.

Response:

In response to concerns over the roof top and massing of the south tower, the mechanical penthouse of the tower above the last occupied floor has been refined, resulting in a net reduction in overall height from 495.4 feet to 474.2 feet. The zoning height as defined by the Boston zoning code remains the same as detailed in the DPIR/DEIR and is in substantial accord with the height guidelines for the PDA-II zoning designation for the Project site under Article 38 of the Boston Zoning Code. Several mid-level, massing elements on the tower corners have also been eliminated in order to make the tower shaft appear more slender and to provide a more graceful transition between the tower and base.

In response to concerns over the general massing of the north tower, the entire tower has been redesigned to be simpler and more symmetrical. Figures 19, 26, 27, 28, 29 and 30 detail the design changes. The zoning height of the redesigned tower is 404.3 feet and the total building height is 465 feet to the top of the mechanical penthouse and rooftop ornament. The tower height is in substantial accord with the height guidelines for the PDA-II zoning designation for the Project site under Article 38 of the Boston Zoning Code.

The north tower design is both sympathetic to, yet differentiated from, the south tower in the use of sculptural massing elements. Both towers are basically symmetrical with multi-faceted sides.

The north tower massing gradually steps back (inward) from the face of the tower shaft toward the top, culminating in a cylindrical top adorned by slender vertical fins around its perimeter. This treatment contrasts to the south tower top which carries the face of the tower shaft to the top, culminating in fragmented vertical piers of differing heights along the perimeter of the tower shaft. Each tower maintains an

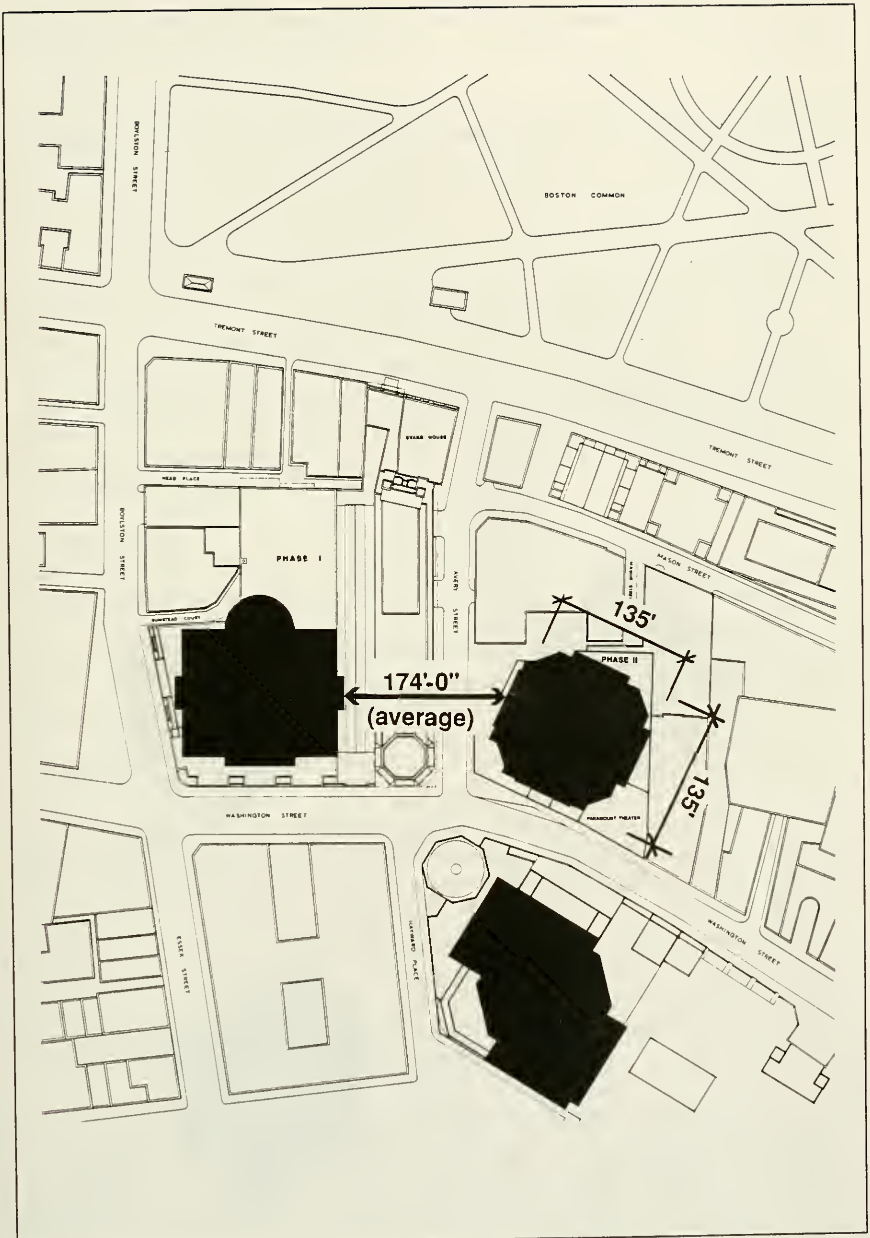


Figure 35. Distance Between the North and South Towers (New Massing Configuration)

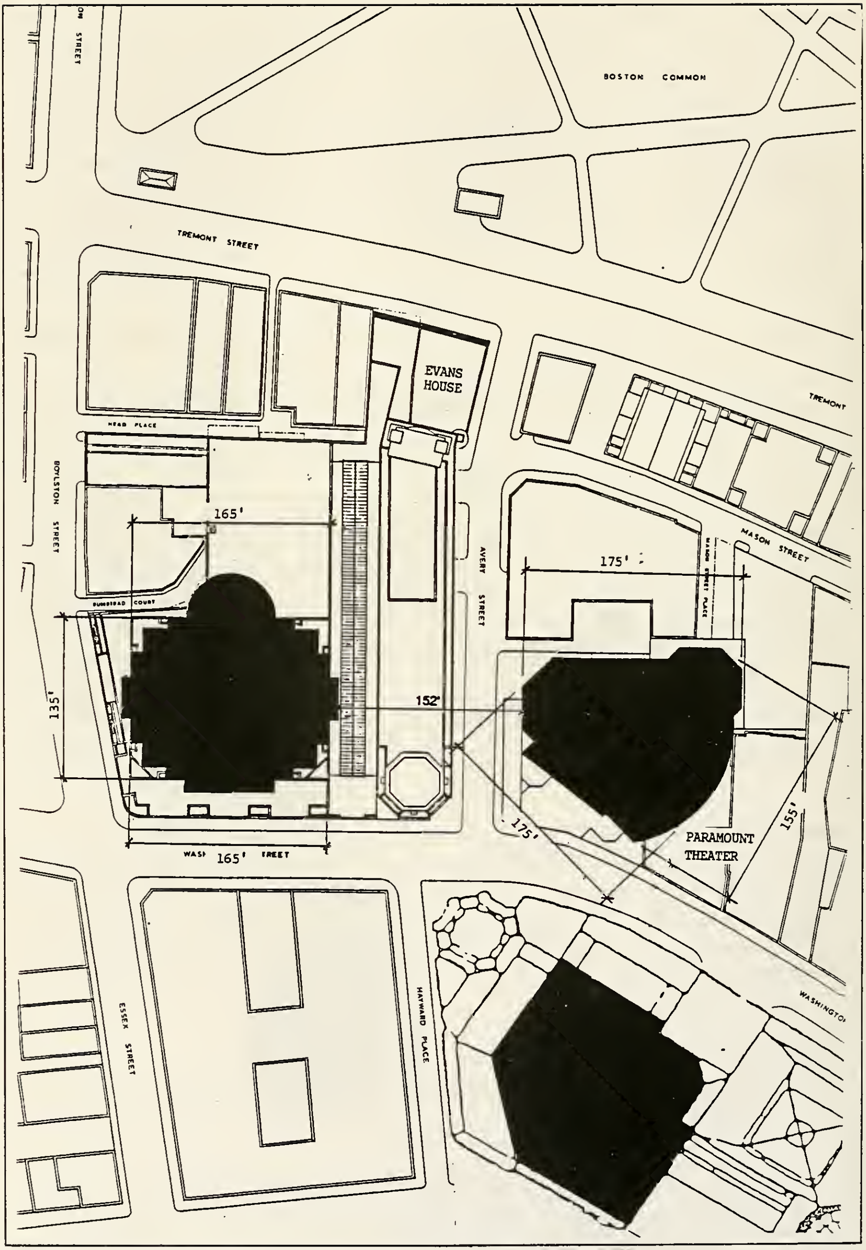


Figure 36. Distance Between the North and South Towers (DPIR/DEIR)

individual architectural identity in form, fenestration and materials, yet both are similar in overall scale and proportion.

The program changes that have occurred as a result of these design changes are detailed in Table 1. The hotel program on Parcel 30 has increased from 291,120 to 321,347 s.f. with the conversion of approximately 30,000 s.f. of retail space to hotel function and administrative uses. The total hotel room count has increased slightly from 414 to 419 rooms. Retail program area has decreased from 151,220 to 99,445 s.f. on parcel 30 and from 10,930 to 8,377 s.f. on the Keith Block. Office program area has been reduced slightly on Parcel 30 and more significantly on the Keith Block, where 67,750 s.f. has been eliminated from the program. On-site day care usage has been reduced from 12,000 to 8,000 square feet, with an agreement to provide the additional 4,000 s.f. as part of a separate development off-site. The total program seating capacity of the cultural facilities (two theaters) and the total parking program remains the same as in the DPIR/DEIR. Overall, the total program of the Proposed Project (exclusive of the cultural facilities) has been reduced from 1.94 million square feet to 1.84 million square feet.

Comment #44

Topic: Urban Design - Streetscape

Comment: Enhance potential for activity on Avery Street by relocating or adding an entrance to the north tower, increasing the prominence and attractiveness of the hotel drop-off and entrance, and providing access to stores.

Response:

In order to enhance the potential for pedestrian retail activity on Avery Street, the entry to the north tower on the Keith Block has been maintained on Washington Street, away from the corner intersection (see Figure 19). This enables the retail frontage to wrap around the corner from Washington Street to Avery Street, similar to the retail corner of the south tower on Parcel 30 at the intersection of Washington and Boylston Streets. The office entry has been centered on the tower above, strengthening the relationship of the tower to the base. This entry has been kept to a minimal width in order to maximize the retail frontage on Washington Street and provide a more continuous pedestrian experience.

A landscaped open space area, with seating and tree plantings has been located at the base of the north tower at the western corner of the Project site along Avery Street (See Figure 19). A secondary entrance to the office lobby has been located off this open space area providing an additional focal point of pedestrian activity. Retail shops at the base of the north tower along Avery Street will open out to the street at grade rather than to the interior lobby, further enhancing pedestrian activity along the street.

The prominence and attractiveness of the hotel drop-off and entrance at Avery Street has been enhanced by the centering of the hotel lobby on the drop-off (see Figure 10), the addition of an interior skylight above this lobby to bring in natural light from the hotel atrium, and the setting forward of three bays of the Avery Street facade at the drop-off location (see Figures 39 through 42).

Comment #45

Topic: Urban Design - Streetscape

Comment: Explore a design alternative which provides direct access for all persons from the Project's internal pedestrian ways to the outbound track of the MBTA Orange Line Chinatown Station.

Response:

The upper stair section of the outbound station entry to the Orange Line Chinatown Station has been relocated from its present position in order to provide more direct access to the project's interior pedestrian ways, and to provide more continuous retail activity wrapping the corner of the base of the south tower at the Boylston/ Washington Street intersection. The existing temporary shell entrance would be replaced by a permanent enclosure as part of the entry loggia to the Parcel 30 office building lobby (see Figure 10). This entry location provides a direct connection, under cover, to the Project's internal pedestrian ways. In addition to the relocation of the station entry, the interior lobby of the Parcel 30 office building has been reconfigured to allow for a wider and more distinct passageway through to the retail galleria (see Figure 10). In addition, the Project Proponent has identified a location that could accommodate the MBTA's future elevator for handicapped access to the outbound platform level of this station (see Figure 12).

Comment #46

Topic: Urban Design - Streetscape

Comment: Explore opportunities for widening sidewalks on Boylston, Washington and Avery Streets.

Response:

Although the City of Boston Public Works Department, the BRA and the BTD are in the process of formulating a plan for the streetscape improvements in this area of the City, no formal plan has been adopted at the issue of this report that would provide guidelines for the widening and material treatment of sidewalks around the Project site. The Project Proponent is proposing to widen sidewalks along the Project boundaries at Avery Street from their currently existing widths varying from 6 to 7 feet, to between 7.5 and 8.0 feet, maintaining a continuous 24 foot Avery Street roadbed width between Washington and Tremont Streets. In addition, the Project Proponent is proposing to widen the sidewalks along the Project boundaries at Washington Street by an average of 3 feet along the Parcel 30 block and a variable amount along the Keith Block, maintaining a minimum Washington Street roadbed width of 18 feet along the Keith Block edge and approximately 28 feet along the Parcel 30 edge with an additional 8 foot width along parcel 30 for a taxi waiting area (see Figure 37). Due to the current traffic volumes on Tremont and Boylston Streets, the widening of sidewalks along the Project boundaries at these streets is not practically feasible.

Material treatments of the sidewalks is expected to follow the guidelines being developed by the City's streetscape design consultant for the Downtown Crossing and the Midtown Cultural District. At present, the proposed sidewalk plan shows a granite curb with concrete paving and a small, variable width band of granite paving at the edge of the Project's buildings. Materials, paving patterns and sidewalk widths will be fully detailed in accord with the City guidelines once they are adopted, and included in design documents to be submitted to the Boston Redevelopment Authority.

Comment #47

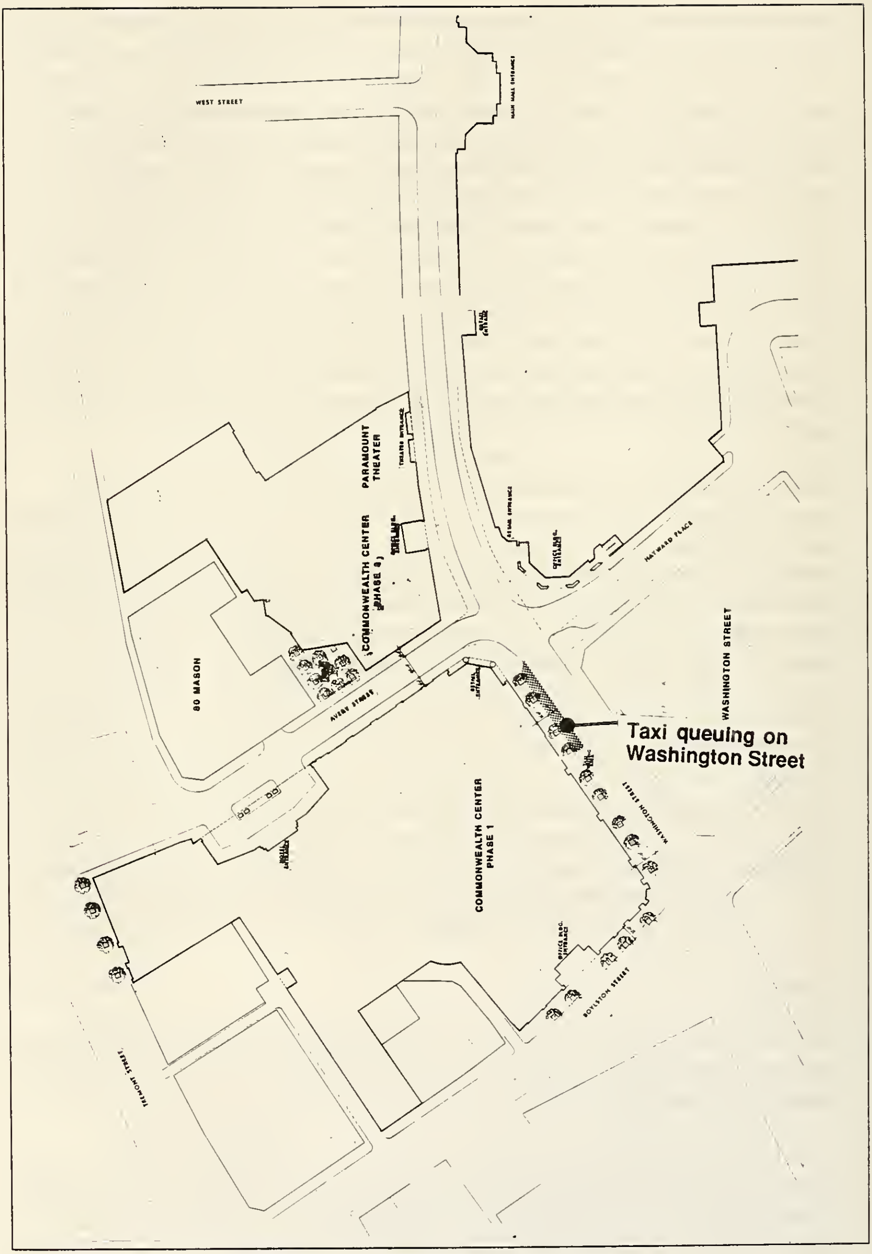
Topic: Urban Design - Facades and Interior Public Spaces

Comment: Include drawings and renderings of exterior facades and interior public spaces of the north tower, hotel, gallery, and south tower elements showing materials and details.

Response:

Figures 10 and 38 through 48 are drawings and renderings that detail exterior facades and interior public spaces of the south tower, hotel, gallery and revised massing and design of the north tower.

A full schematic design submission set of drawings that includes revised massing studies, site sections and perspective renderings of the amended Proposed Project has been submitted to the Boston Redevelopment Authority. A list of these materials appears in the Technical Appendix.



Taxi queuing on Washington Street

Figure 37. Proposed Sidewalk Widening on Washington and Avery Streets

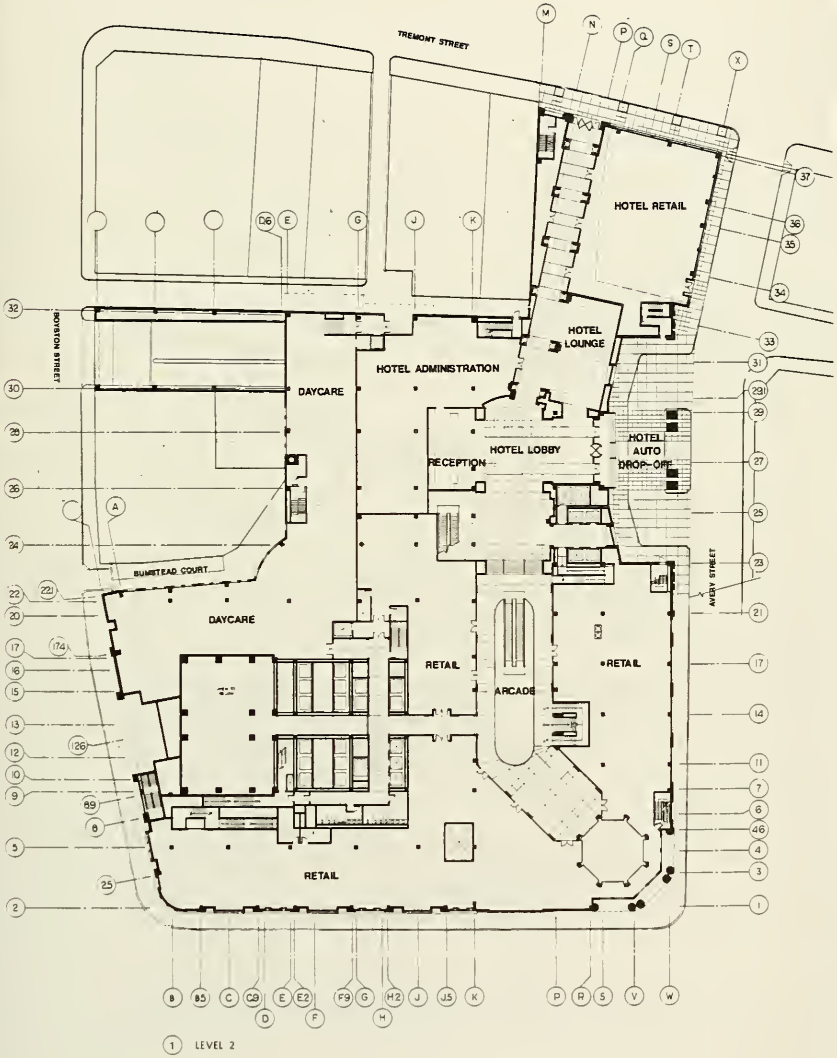


Figure 38. Parcel 30- Level 2

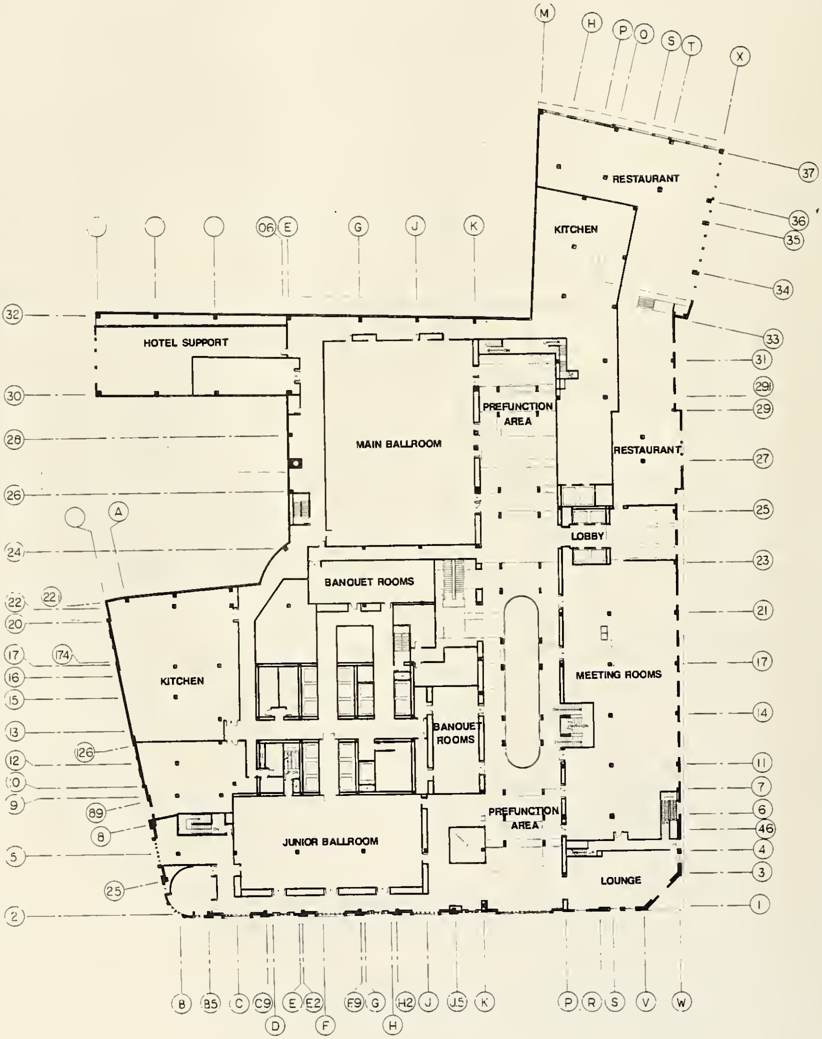


Figure 39. Parcel 30 - Level 3

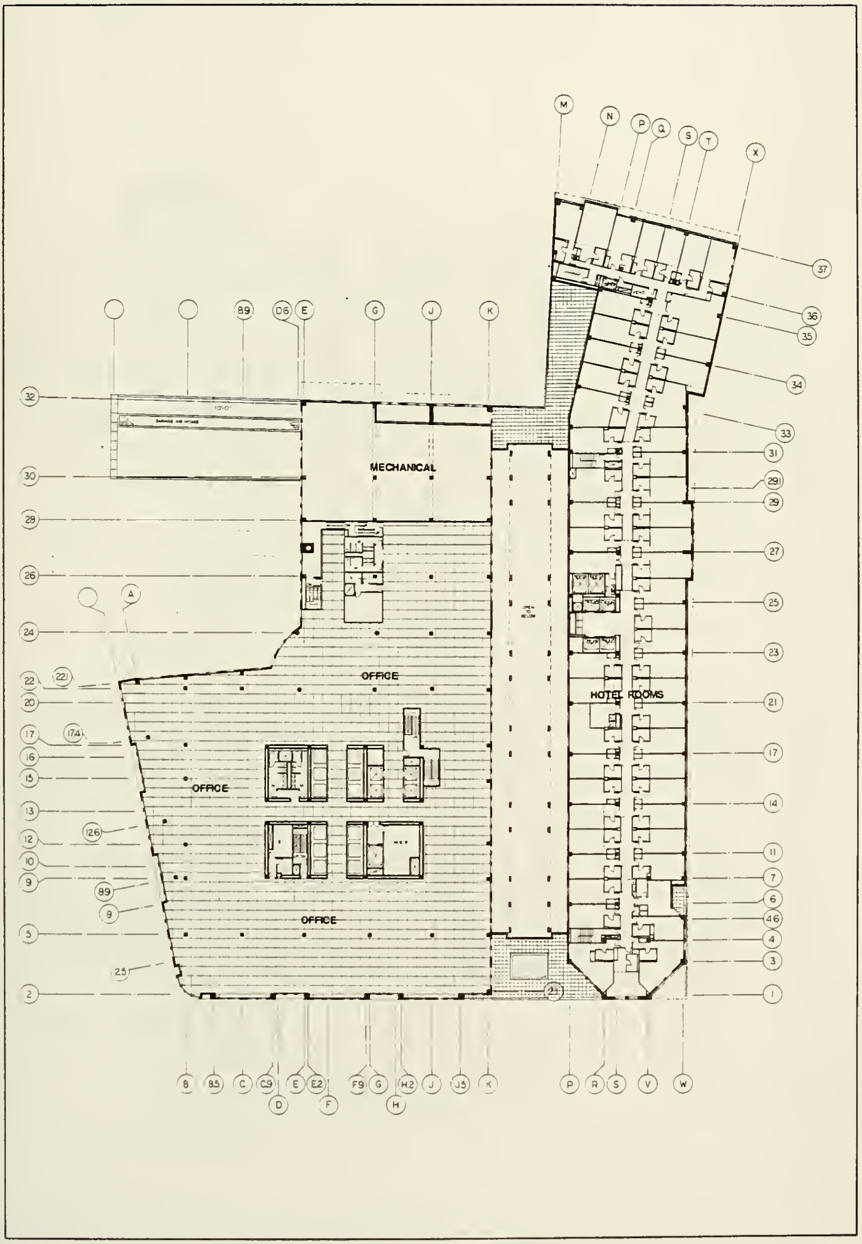
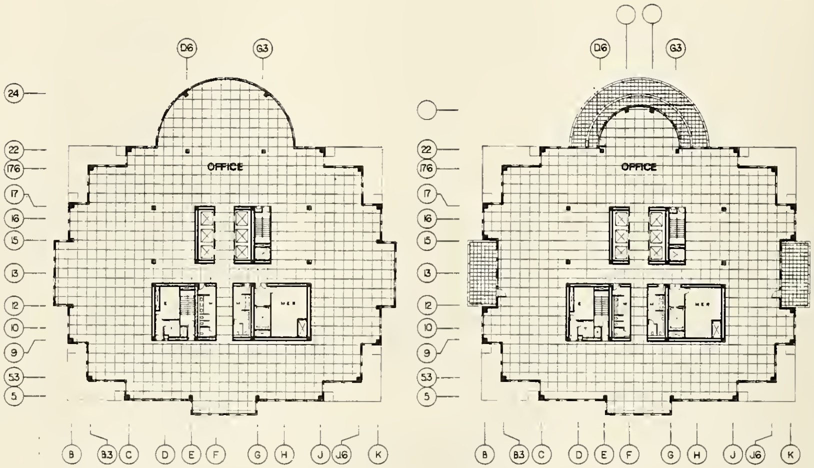
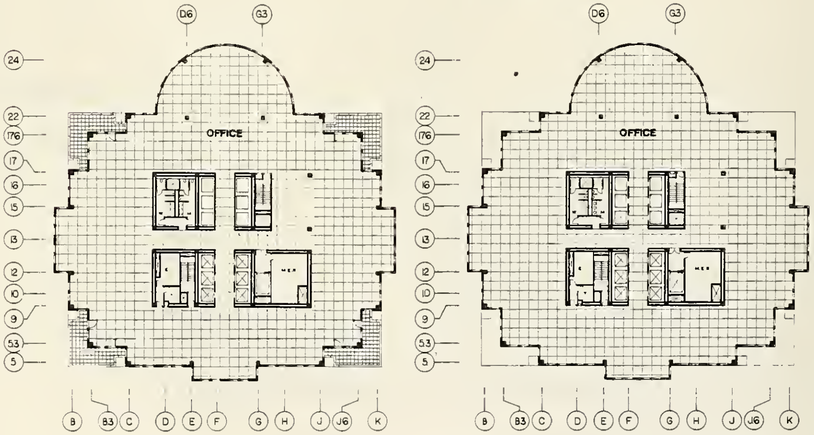


Figure 40. Parcel 30 - Level 4-5 (Office)



③ LEVELS 23-28

④ LEVELS 29-31
(LEVEL 31 SHOWN)



① LEVELS 16-19

② LEVELS 20-22
(LEVEL 20 SHOWN)

Figure 41. Parcel 30 - Level 16-31 (Office)

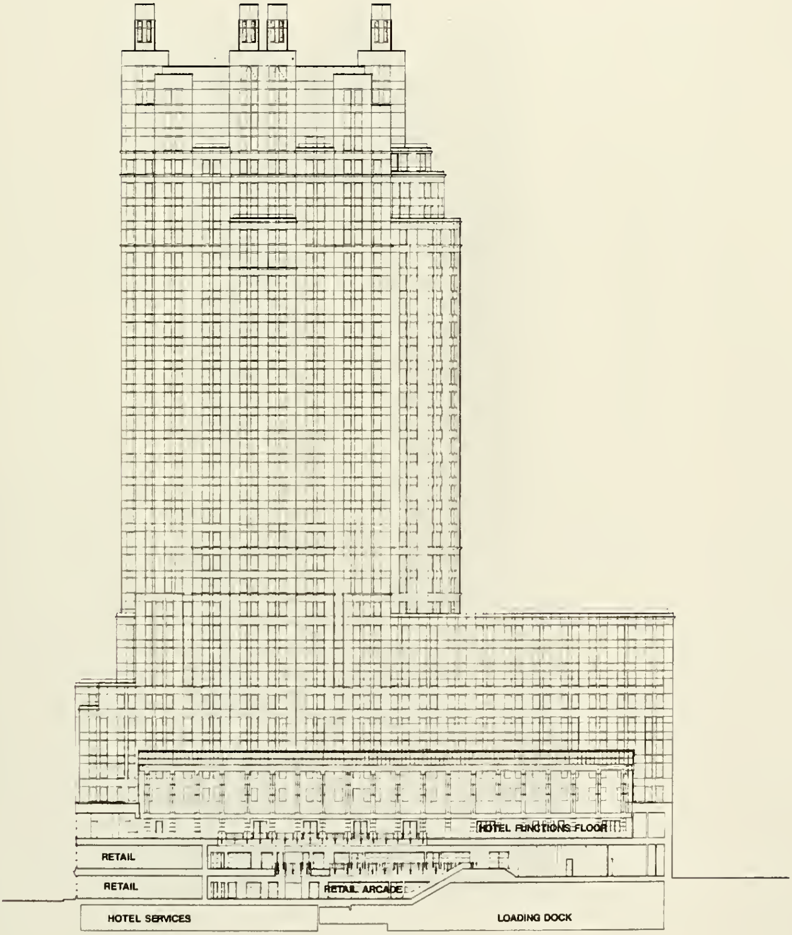


Figure 42. Parcel 30 - North Elevation (Office Tower)

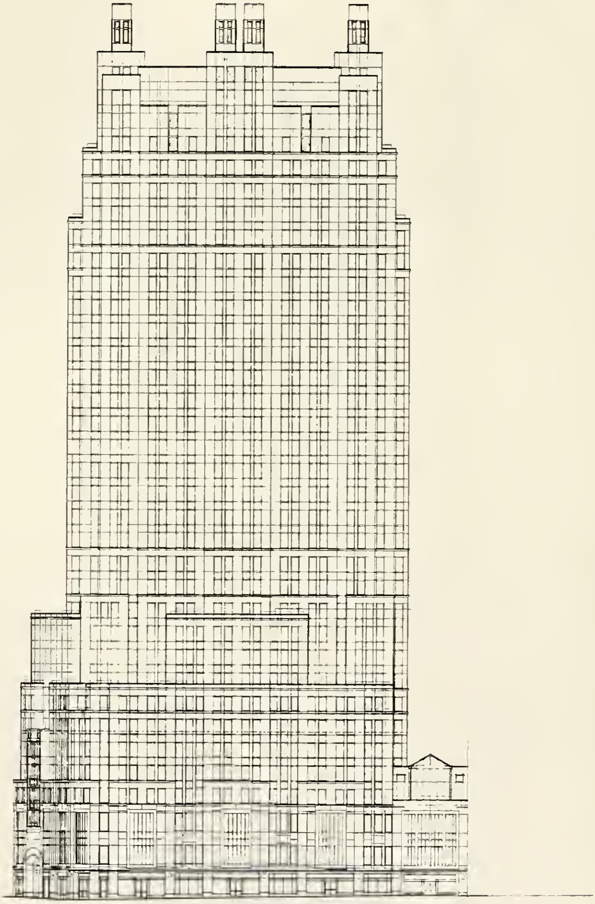


Figure 43 . Parcel 30 - East Elevation (Office Tower)

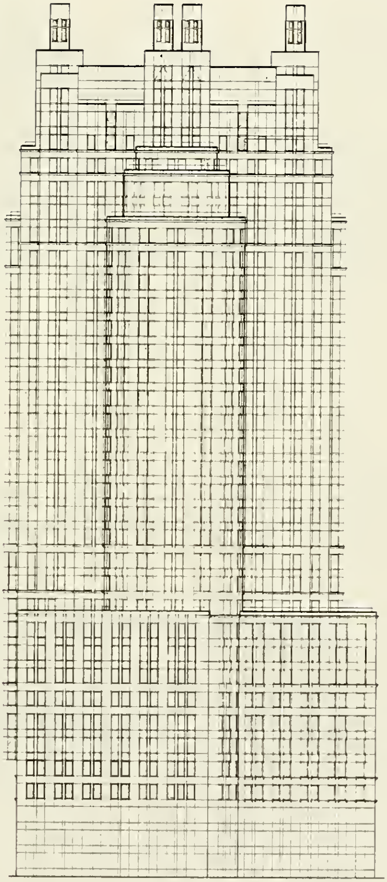
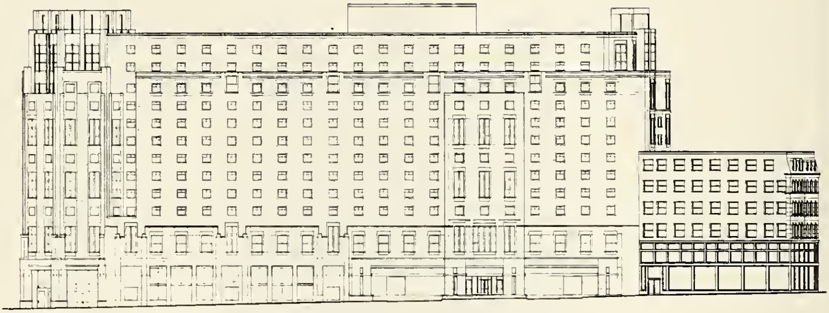
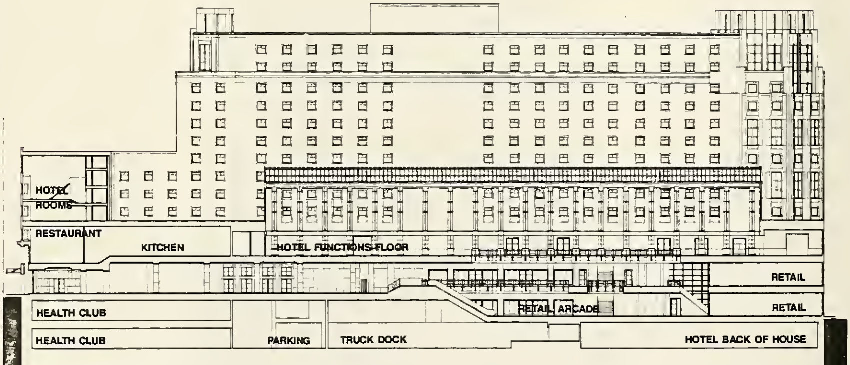


Figure 44 . Parcel 30 - West Elevation (Office Tower)

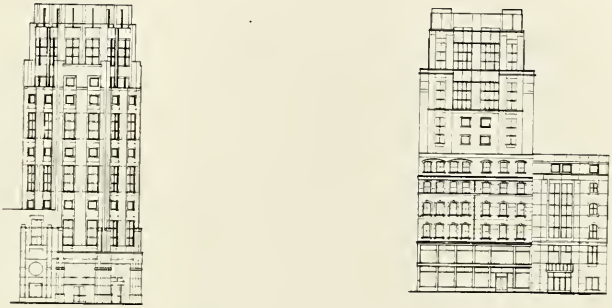


② NORTH ELEVATION – HOTEL



① SOUTH ELEVATION – HOTEL

Figure 45. Parcel 30 - North and South Elevations (Hotel)



① EAST ELEVATION – HOTEL

② WEST ELEVATION – HOTEL

Figure 46. Parcel 30 - East and West Elevations (Hotel)

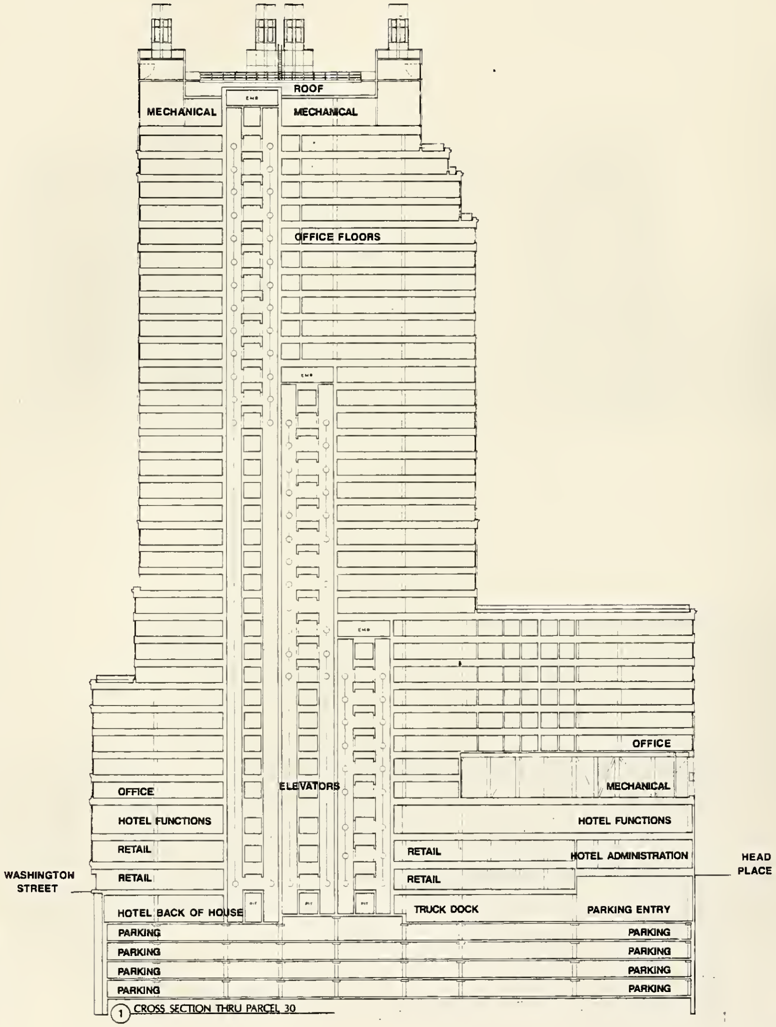


Figure 47. Parcel 30 - Cross Section

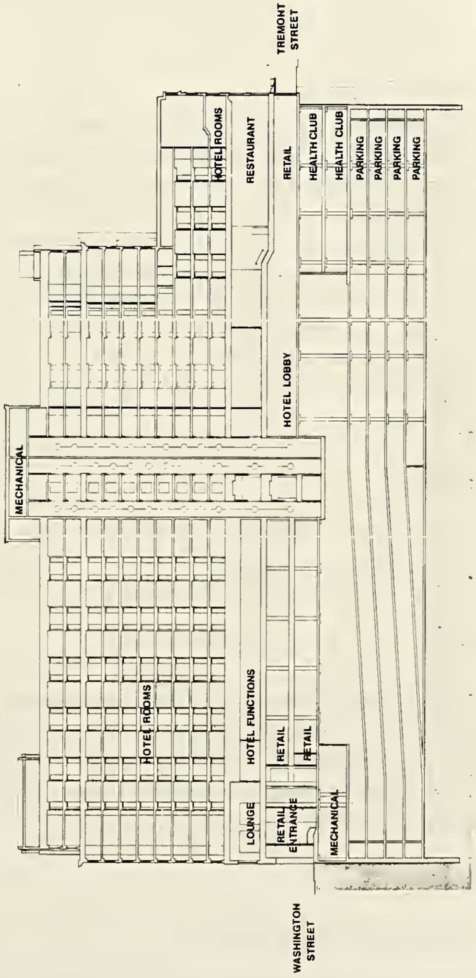


Figure 48. Parcel 30 - Section Through Hotel

Comment #48:

Topic: Urban Design - Facades and Interior Public Spaces

Comment: Provide evidence of the establishment of a program to engage artists in collaboration with architects.

Response:

In accordance with the requirements of the Cooperation Agreement between the Project Proponent and the Boston Redevelopment Authority, the Project Proponent will be selecting a visual artist to work in collaboration with the Project architect to incorporate the artist's creative input into the design of selected elements of the Project's public spaces. Prior to the collaborative process, the Project Proponent will identify a short list of several artists to be selected for interviews for this design collaboration. As part of the interview process, these candidates will be asked to submit portfolios for review before one is selected. Following selection, the artist will identify appropriate areas within the project for the design collaboration and work with the Project architect on the subsequent design and execution of the specific elements.

Comment #49:

Topic: Urban Design - Facades and Interior Public Spaces

Comment: Include detailed floor plans of the day care facility.

Response:

A day care operator has been retained as a consultant during the Schematic Design phase of the Project. A specific location on the second floor of the Parcel 30 building has been determined through consultation with this operator which meets the operator's basic functional requirements for an 8,000 square foot facility (see Figure 49 for a more detained plan).

Comment #50:

Topic: Urban Design - Open Space

Comment: Include studies which illustrate options for outdoor public open space on Washington Street.

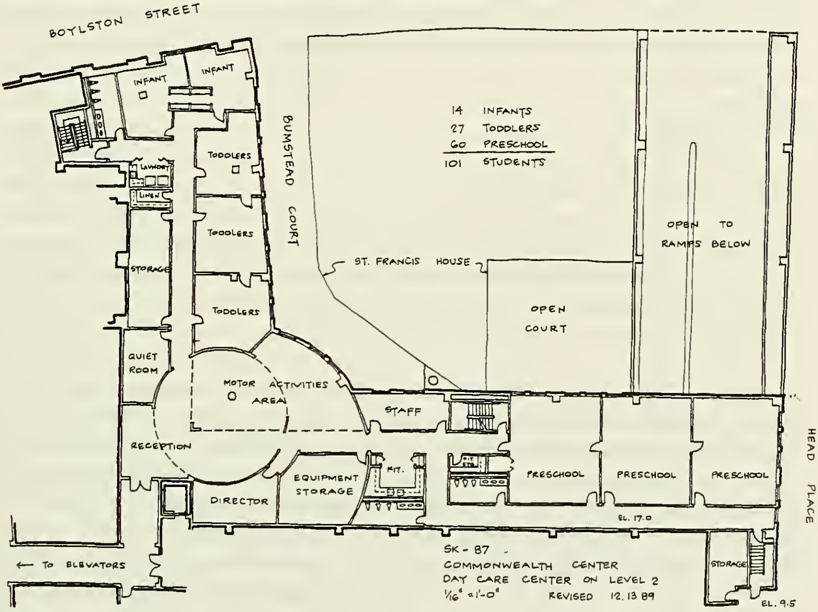


Figure 49. Plan of Daycare Facility

Response:

Open space areas have been added to the Proposed Project at two locations on the Keith Block at the base of the north tower. The base of the north tower building at the intersection of Washington and Avery Streets has been set back from the traditional line of the streetwall to enlarge the sidewalk area at this important corner. Pulling the building back relieves the potential pedestrian congestion at the corner and allows for a direct pedestrian view corridor along Washington Street from the Downtown Crossing to the hotel octagon and retail entrance on the Parcel 30 corner (see Figure 19). In addition, a landscaped open space area, with seating and tree plantings has been located at the base of the north tower at the western corner of the Project site along Avery Street. A secondary entrance to the office lobby has been located off this open space area providing an additional focal point of potential pedestrian activity.

Comment #51:

Topic: Urban Design - Open Space

Comment: Include materials which illustrate options for public use of roof top space throughout the project, including possible use of roof space as required outdoor play space for the day care facility.

Response:

The Project Proponent has explored the possibility of using roof areas within the Project for public open space. While such limited use may be possible, the separate and dedicated means of vertical access and egress requirements would make all such possibilities very difficult to accommodate programmatically and prohibitively costly to build. Alternatively, the Project Proponent and the day care operator will be working with the City of Boston Department of Parks and Recreation to accommodate the need for outdoor play space within the Boston Common tot lot or other local areas of the park system. City regulations governing daycare requirements for open space are contained in the Appendix. New regulations are being promulgated that will supersede these. The Project Proponent will work with the City to accommodate all such program requirements once they are adapted.

Comment #52:

Topic: Historic Resources

Comment: Include a feasibility study of retaining the existing interior floor system and structure of the Evans House.

Response:

Evaluation of alternatives for treatment of the Evans House are included in the Evans House Evaluation Report dated September 27, 1989 which is available under separate cover from the Boston Redevelopment Authority, Massachusetts Historic Commission, or the Boston Landmark Commission.

Three alternatives are evaluated; the first providing for maximum rehabilitation of the existing building (see Figures 50, 51 and 52), the second providing for the demolition of the floors and interior structure, and retention and rehabilitation of the Avery and Tremont Street facades only, and the third alternative providing for the complete replacement of the structure with new construction compatible with the historic district character. Due to the extent of the degradation of the structure and the primary facade on Tremont Street uncovered during the building evaluation, the preferred alternative of the Project Proponent is to replace the existing building with new construction compatible with the scale and character of the Piano Row National Register Historic District. Design of this replacement building will be subject to the general standards and criteria of the Boston Landmarks Commission for an infill structure within this historic district, and the standards of the U.S. Secretary of the Interior. Within the applicable design standards, three specific options will be explored for this replacement structure. The first is a replication of the existing design, dating to the historic period in which Avery Street was extended to Tremont Street. Historic photos of the Evans House date this to approximately 1914. The second design option retains the existing scale and volume of the building, with a new, contemporary design of the buildings elevations, using design elements and materials consistent with the adjacent historic buildings. The third design option will explore a new structure with the scale, volume, fenestration and facade materials consistent with the adjacent buildings in the Piano Row National Register Historic District. The Project Proponent will review the design of this replacement building with the Massachusetts Historical Commission, the Boston Landmarks Commission, the Boston Redevelopment Authority, the Boston Preservation Alliance and the Boston Civic Design Commission.

Comment #53:

Topic: Historic Resources

Comment: Include alternative designs for the lower floors of the Evans House that restore the original character.

Response:

Alternatives for treatment of the lower floors of the Evans House are discussed in the

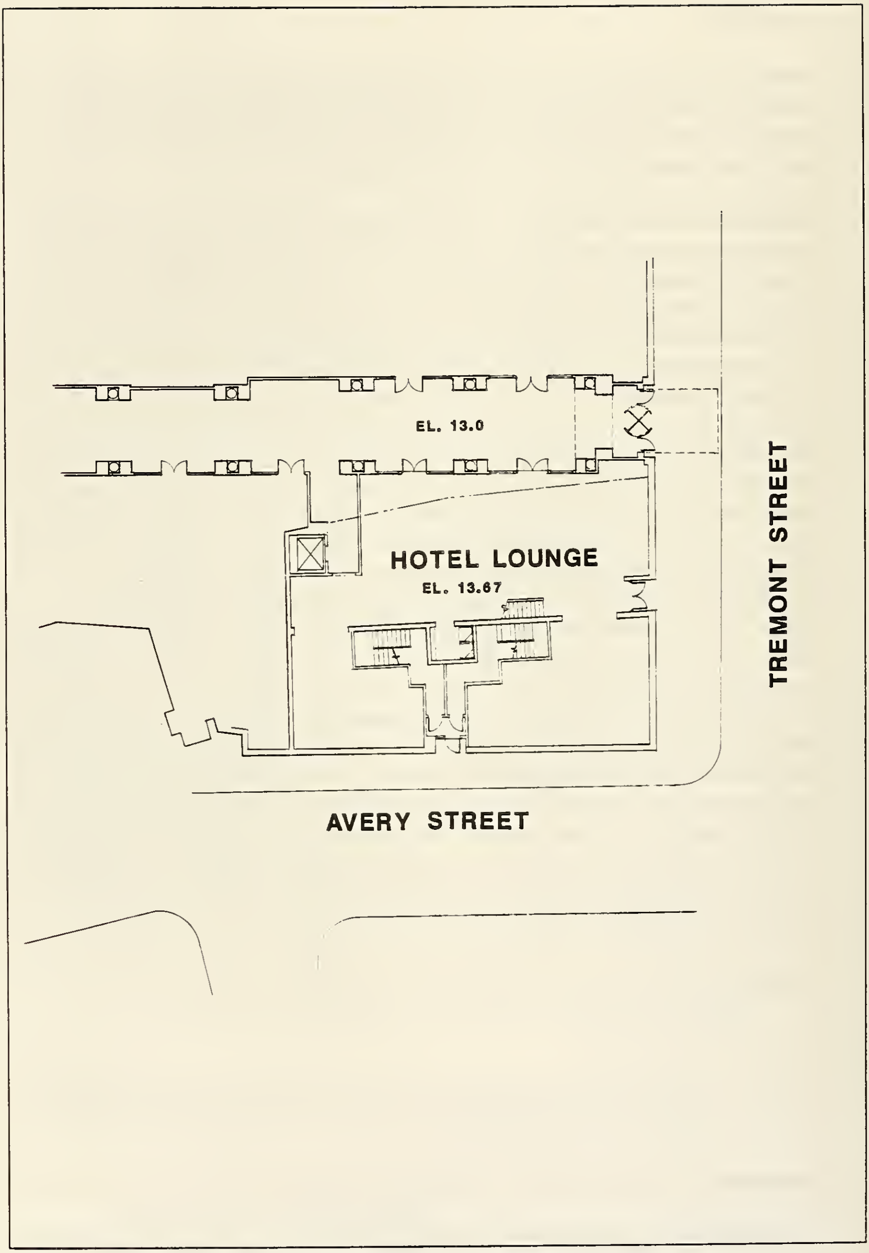


Figure 50. Evans House - Plan of Retaining Interior Floor System and Structure (Ground Floor)

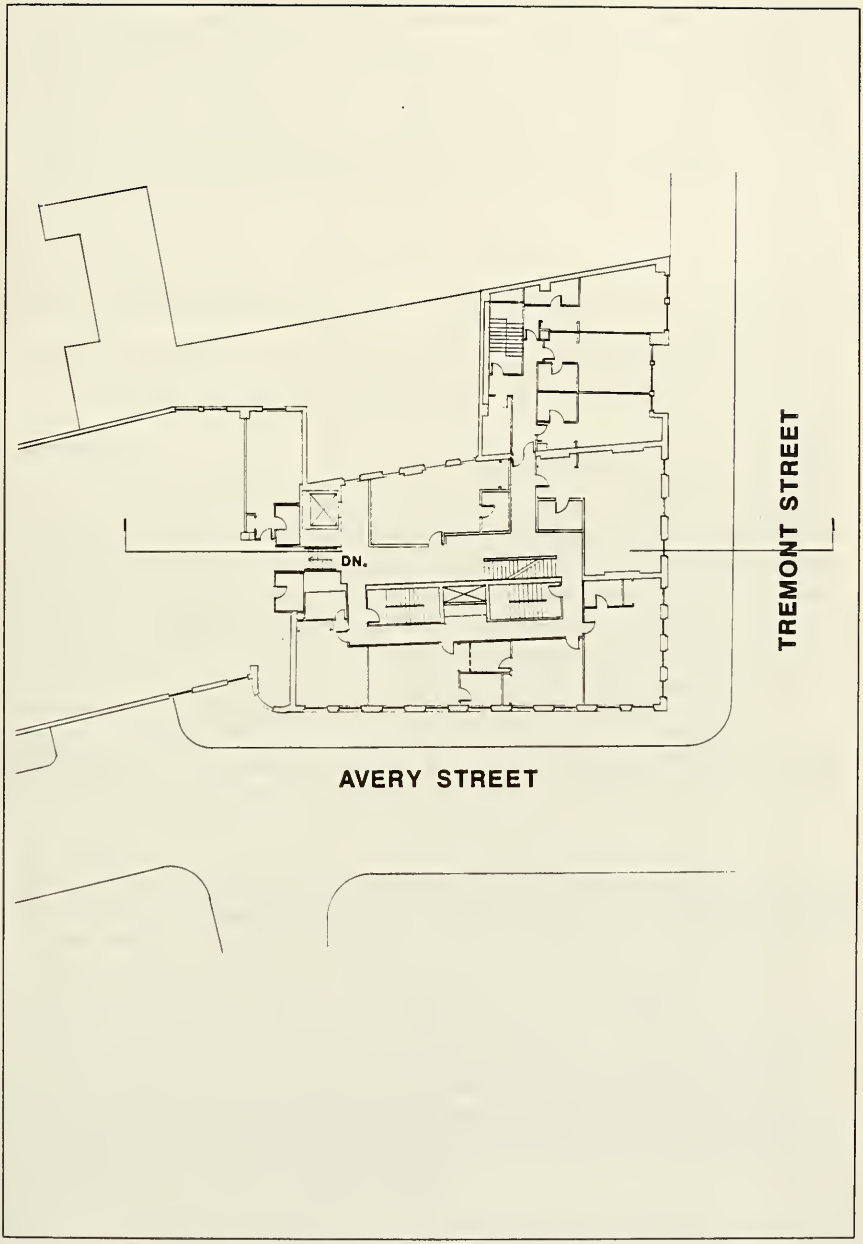


Figure 51. Evans House - Plan of Retaining Interior Floor System and Structure (Floors 4-6)

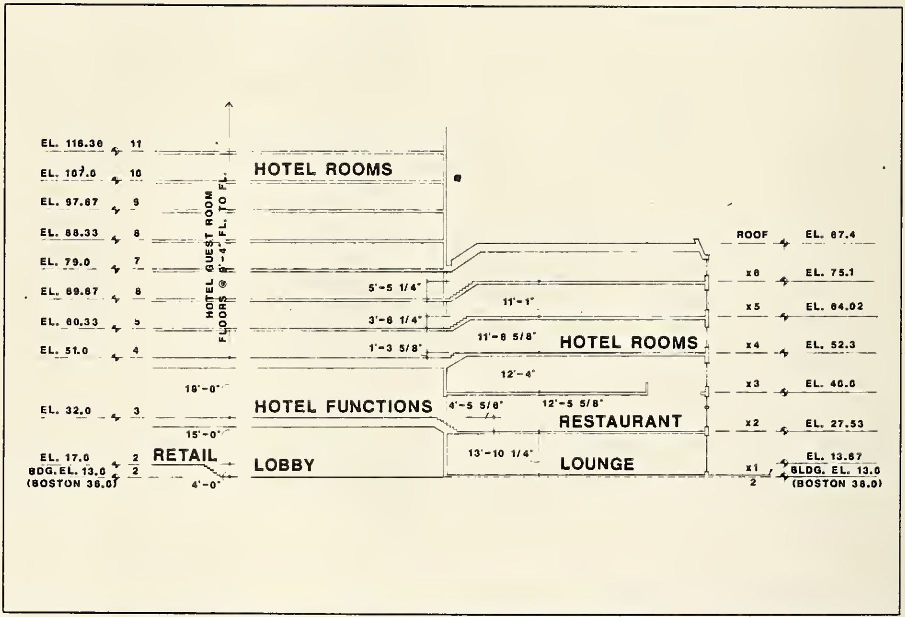


Figure 52. Evans House - Section Retaining Interior Floor System and Structure

Evans House Evaluation Report dated September 27, 1989. The only historically accurate alternative would be restoration to the 1914-1925 appearance, after Avery Street was created. This alternative would allow for preservation of much of the existing cast iron storefronts at the lower floors, which may have, by virtue of their age and design, gained significance in their own right. Very good photo documentation is available to form the basis of restoration or replacement construction of the building to this period.

Comment #54:

Topic: Historic Resources

Comment: Alternative north tower design should have minimal visual impact on the restored facade of the Paramount Theater.

Response:

The portion of footprint of the redesigned north tower that falls over the Paramount Theater is substantially similar to the footprint of the original design detailed in the DPIR/DEIR (see Figure 53). The primary difference between the two designs that affects the Paramount Theater is the profile of the tower's northerly face that spans over the theater. As with the original design, the face of the tower over the Paramount is set back from the Paramount's Washington Street facade and recedes away toward the rear of the site. The original design presented in the DPIR/DEIR maintained a cylindrical curved face with a series of curving setbacks at the top, accented by heavy cornice lines. The revised design presents a narrower, more orthogonal, faceted tower wall with a series of setbacks at each facet. The northerly face of the redesigned tower maintains a similar orientation to Washington Street as the original design, but with a more subtle fenestration pattern and less emphasis on the frontally and monumentality of the facade toward Downtown Crossing. The redesigned north tower is a more symmetrical, slender building with smaller floor plates and smaller dimensional widths to each face, and is two stories taller than the original design, although the total program area is approximately 67,750 square feet smaller than the original design. The redesigned tower massing reflected in the FPIR/FEIR has been reviewed by the Boston Landmarks Commission and has been granted Conceptual Approval (see Technical Appendix). The Project Proponent will continue to review the north tower design with the Boston Landmarks Commission through subsequent phases of the design process. The redesigned tower has been analyzed for changes to wind, shadow, daylight and historic resources impacts identified in the DPIR/DEIR. Additional effects and mitigation measures have been identified in other sections of the FPIR/FEIR.

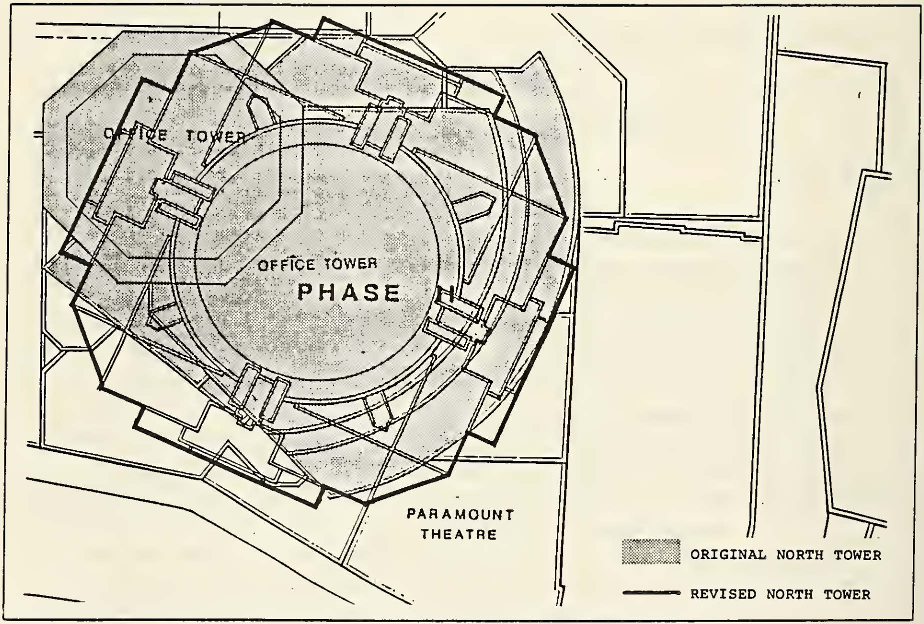


Figure 53. Comparative Footprints of the North Tower Over the Paramount Theater

Comment #55:

Topic: Historic Resources

Comment: Change title for Category III buildings from “Notable” to “Significant”.

Response:

These corrections have been made, and this corrected section is available upon request from the Project Proponent.

Comment #56:

Topic: Historic Resources

Comment: Identify the Boston Common, Public Garden, Boylston Building, and Young Men’s Christian Union as Boston Landmarks; YMCU should be included in section entitle “Boston Landmarks Adjacent to the Site”.

Response:

These properties are included in the appropriate sections.

Comment #57:

Topic: Historic Resources

Comment: Remove Oliver Ditson Building from Figure 176.

Response:

See Figure 54 for a corrected figure.

Comment #58:

Topic: Historic Resources

Comment: Note that both the Savoy/Keith Memorial Theater and Filene’s have been petitioned for Boston Landmark Status.

Response:

The clarification of these properties as having been petitioned for Landmark status

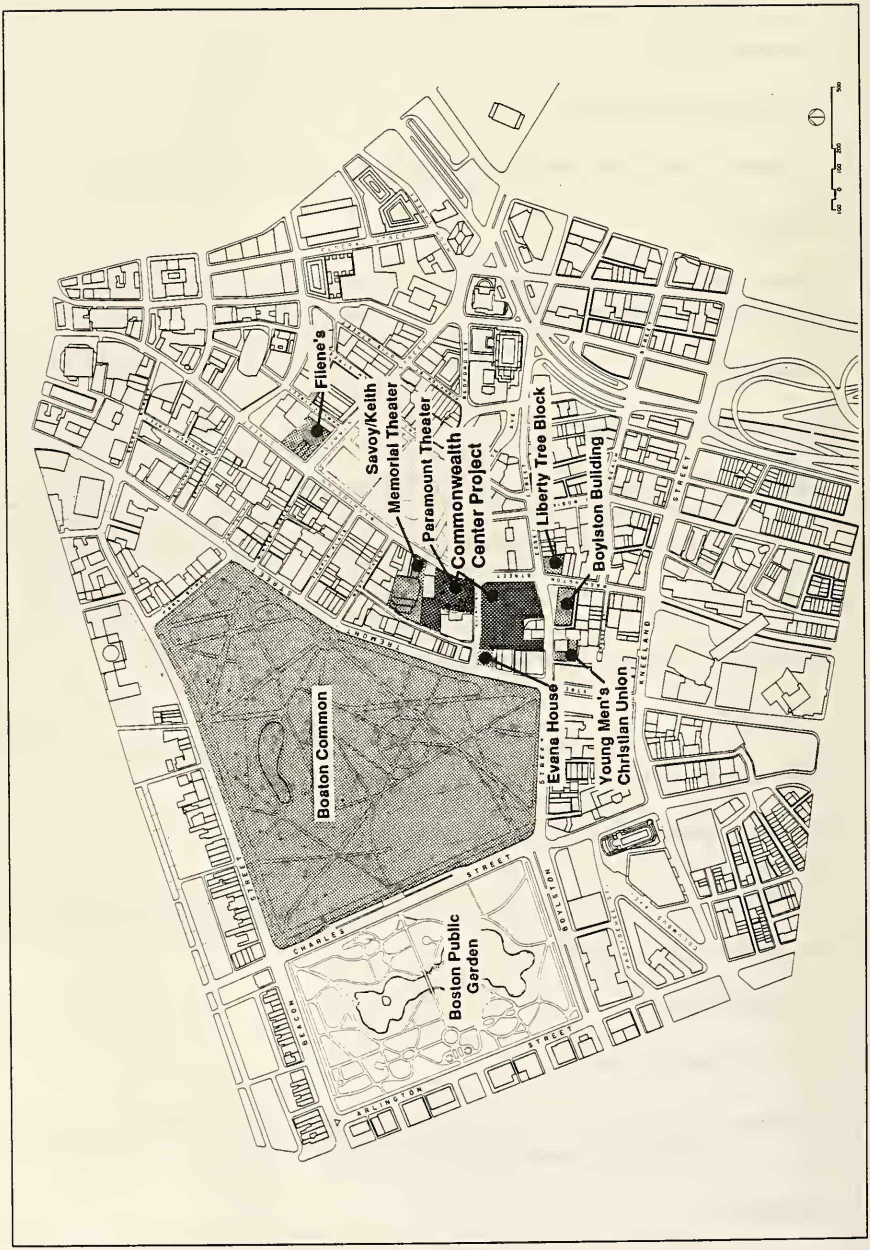


Figure 54. Designated and Pending Landmarks Affected by the Proposed Project

rather than as designated landmarks has been made. No change to the results of the analysis presented in the DPIR/DEIR is indicated.

Comment #59:

Topic: Infrastructure

Comment: Clarify whether any utilities or systems require relocation or termination due to construction over old alleys or under Avery Street.

Response:

Existing telephone, water and sewer utilities in Haymarket Place will be removed and terminated at Avery Street. A six inch (6") steam line owned by Boston Thermal which bisects Parcel 30 will be removed and relocated around the site in Avery, Washington and Boylston Street. The Project Proponent has met with Boston Thermal and a routing has been agreed upon for this location. Engineering studies are currently underway at Boston Thermal for this work. The Proponent will work with the various public and private utilities to develop definitive relocation or termination plans and to accommodate all the utility needs of the Project.

Comment #60:

Topic: Infrastructure

Comment: Address fire service connections in greater detail.

Response:

Currently there are sixteen fire pipe connections to the existing structures on the Project site. Fourteen of these fire pipe connections are from 16-inch Southern High Service Mains and the remaining two are from 12-inch Mains also on the Southern High System. There are a total of 16 street fire hydrants in the proximity of the Project site. Of the 16 fire hydrants, 13 connect to the High Pressure Fire service which is operated by the Boston Fire Department. Of the remaining three hydrants, two are connected to the Southern High System and one is connected to the Southern Low System.

All fire services, both during construction and in the permanent structures, will be installed and maintained in conformance with the Boston Fire Code and the Massachusetts Building Code, latest edition.

Connections, relocations and abandonments of fire service pipe and hydrants will be performed in conformance with BWSC standards and approvals will be obtained through BWSC site plan submittal process. Presently, fire service connection points are planned in Avery Street and Boylston Street - one each (see Figure 55).

Comment #61

Topic: Infrastructure

Comment: Discuss more extensive efforts to conserve water and energy.

Response:

The MWRA has found that the most substantial means for water conservation is through the use of water saving sinks, faucets, water closets and showers. The Proposed Project will include 0.5 gpm flow restriction on lavatory and sink faucets, 1 gallon/flush valves on urinal closets, 3 gallon/flush valves on water closets serving office space and 3.5 gallon/flush tank type water closets serving the hotel space. These water conservation measures will save an estimated 20-25% of the water demands for the Proposed Project vs. conventional fixtures and hardware. The water demands calculated for the Proposed Project did not take into account the water conserving fixtures.

The MWRA has produced educational bulletins on water use and conservation for the office worker, hotel guest and for facility maintenance personnel. Educational information will be made available to tenants, guests and maintenance personnel. Report-a-Leak information will also be posted in lavatories.

Comment #62

Topic: Infrastructure

Comment: Coordinate construction and improvement of infrastructure systems with adjacent projects such as Parkside and Boston Crossing.

Response:

The Project Proponent has been in extensive contact with representatives of both the Boston Crossing and One Lincoln Street Projects. No discussions of substance have taken place with the Parkside developers as their development is currently in bankruptcy, Chapter 11 proceedings. According to the Boston Redevelopment Authority, the Parkside projects have all either been fully approved or conditionally approved.

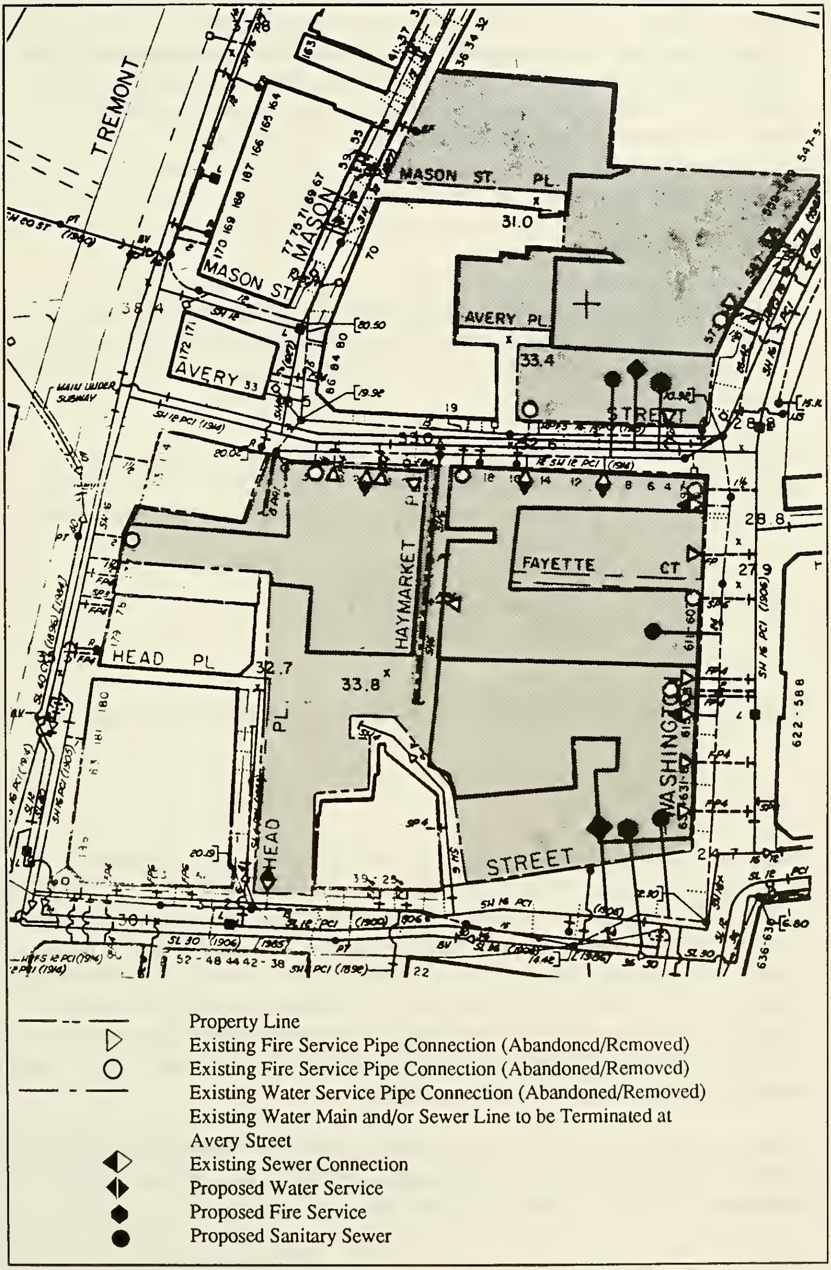

TREMONT
MASON ST.
MASON ST. PL.
MASON
AVERY
AVERY PL.
AVERY STREET
HAYMARKET PL.
FAYETTE CT
HEAD PL.
HEAD PL.
WASHINGTON STREET
31.0
33.4
32.7
33.8
28.8
27.9
MAIN UNDER SUBWAY
622 - 588
636-630
52 - 48 44 42 - 38
—— - - —— Property Line
▷ Existing Fire Service Pipe Connection (Abandoned/Removed)
○ Existing Fire Service Pipe Connection (Abandoned/Removed)
—— - - —— Existing Water Service Pipe Connection (Abandoned/Removed)
Existing Water Main and/or Sewer Line to be Terminated at Avery Street
◆ Existing Sewer Connection
◆ Proposed Water Service
⬢ Proposed Fire Service
● Proposed Sanitary Sewer

Figure 55. Existing and Proposed Fire, Water and Sewer Service Connections

Analyses of infrastructure improvements/alterations to the storm and sanitary sewer systems in the vicinity of the project sites have been presented to the Boston Water and Sewer Commission by the several developers. The Commission is currently reviewing the information. As of this time, no program for implementation of infrastructure improvements has been proposed.

Comment #63:

Topic: Infrastructure

Comment: Discuss how sewer systems used in abutting streets and primary connections will be upgraded to separate storm and sanitary systems.

Response:

All primary connections to the storm and sanitary systems will be made in conformance with BWSC standards. These standards required all new sewers to be installed separately in a manner that is conducive to main line system separation.

Comment #64:

Topic: Infrastructure

Comment: Include more information about the potential network expansion by Boston Gas.

Response:

The existing Boston Gas Company mains have sufficient capacity to service the anticipated gas load for Phase I of the Commonwealth Center project. These gas loads may include hotel and restaurant requirements. The Proponent will continue to coordinate efforts with Boston Gas Company for service points. Boston Gas has stated that the current system capacity is adequate, at this time, to meet the need of Phase I of the Commonwealth Center project. Ability to provide gas service to Commonwealth Center could be affected by requests from other customers in the area and no guarantee of service can be granted until a formal agreement between the developer and Boston Gas Company is reached.

Local improvements are sometimes necessary to meet new demands from large users and Boston Gas plans to continue its standard practice of making local system improvements on an as-needed cost-shared basis.

Boston Gas continually reviews future project demands in target growth areas to identify necessary system improvement requirements to assure that natural gas remains an economically viable energy source. A network analysis conducted to identify specific improvements may be required, but the results would be of marginal use because of continuously changing demands from numerous customers in the area. As the needs for the Midtown Cultural District for the more distant future (5 years +/-) become more apparent, Boston Gas will be able to more accurately determine what system improvements may be necessary.

Boston Gas has indicated a strong willingness and desire to participate in the planning process for the Midtown Cultural District. They are currently marketing natural gas as an energy source to many of the developers and as demands become more definite, plans for improvements are being made.

III. LETTER 2: EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE DPIR/DEIR

Letter #2

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

MICHAEL S. DUKAKIS
GOVERNOR

JOHN DeVILLARS
SECRETARY

AUG 11 1989

July 17, 1989

JUL 31 1989

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
ON THE
DRAFT ENVIRONMENTAL IMPACT REPORT

PROJECT NAME :Commonwealth Center
PROJECT LOCATION :Boston
EOEA NUMBER :7113
PROJECT PROPONENT :Commonwealth Center Ltd. Partnership
DATE NOTICED IN MONITOR :June 12, 1989

The Secretary of Environmental Affairs herein issues a statement that the Draft Environmental Impact Report (DEIR) submitted on the above project adequately and properly complies with the Massachusetts Environmental Policy Act (G.L.,c.30,s61-62H) and with its implementing regulations (301 CMR 11.00).

The project, as proposed, will involve a mixed use development to be constructed on a 3.3 acre site which is located on two blocks between lower Washington Street and the Boston Common.

1 The DEIR has generated comments from others on water, sewer, traffic, building heights, etc., which must be addressed in the Final Environmental Impact Report (FEIR). In addition, the FEIR must also include a summary discussion of all mitigation which is required, indicating who will be responsible for implementing it. This additional information shall be presented in similar fashion to a Draft Section 61 Finding for all aspects of the project which were required by the Scope. Lastly, the FEIR must address the comments on the DEIR which are listed below.

2 1. It is not clear from the DEIR as to whether the project currently consists of 1.7 million square feet as is indicated in Figure 1 or 1.9 million as is indicated elsewhere in the document. If the smaller figure is correct, what bearing will that have on the analyses which apparently have been based on the larger figure?

100 CAMBRIDGE STREET, BOSTON MA 02202 (617) 727-9800

3 4 5 6 2. Generally, the traffic analysis in the main text of the document provides limited and confusing data which *may* be clarified in the Technical Appendices. For example, on page 52 several other projects are listed which were supposedly considered in determining the background growth conditions. However, the accompanying figure (Figure 6) omits at least one of the major development projects (i.e. Kingston Bedford) and perhaps others as well. Also, there is no indication as to how large and what types of uses are considered for each project. It is known that the Kingston Bedford project is considering a range of from 450,000 square feet to up to 950,000 square feet and it is unclear as to which figure may have been considered in this DEIR. How does the traffic analysis take into account the proposed widening of Essex Street? Lastly, the EOTC comment letter raises concern regarding the modal split estimates and the occupancy per car figures which are presented. Such information must be elaborated on in the FEIR.

7 3. The massing perspectives which are presented for each alternative in Figures 9, 10, 11, and 12 fail to identify the viewer perspective.

8 4. The discussion of construction impacts must be expanded to include a description of the amount and types of materials which will be demolished including how and where it will be disposed of. Such information is of interest to the Department of Environmental Quality Engineering and others who are charged with tracking demolition disposal in the Commonwealth.

July 17, 1989
DATE

John DeVillars, Secretary

Comments received :
MBTA 7/13/89
Lee 7/10/89
Silva 6/16/89
BWSC 7/6/89
MWRA 7/7/89
MAPC 7/5/89
DEQE DAQC 7/10/89
EOTC 7/10/89

JD/JW/jiw

LETTER 2: EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE DPIR/DEIR.

Comment #1:

Topic: General

Comment: Include a summary discussion of all mitigation required indicating the party responsible for its implementation.

Response: A summary discussion of all impacts and mitigation is included in Chapter I. This additional information is presented in similiar fashion to a draft Section 61 Finding for all aspects of the project required by the scope.

Topic: Program

Comment: Clarify program inconsistencies and explain the effect of using the larger figure for the various analyses conducted.

Response:

The program discrepancy between the total floor areas that appeared in Section I., Figure 1 of the DPIR/DEIR was an error and has been corrected (see Table 2). For the determination of environmental effects, all environmental analyses included as part of the DPIR/DEIR and the FPIR/FEIR have been conducted using the correct maximum square footage of total program area.

Physical design changes to the Proposed Project made in response to comments received in the BRA and MEPA Preliminary Adequacy Determination have been analyzed to determine possible increases to the level of environmental effects noted in the DPIR/DEIR. Where design changes have been made or design options identified to mitigate deleterious effects, test analyses have determined the reduction in impact levels. As a result of the design revisions, some program areas have changed. The revised program areas are given in Table 1 and reflect an overall reduction from the original program of 1.94 million gross square feet as listed in

Table 3 of the DPIR/DEIR to 1.84 million gross square feet. A discussion of the revised program appears in Chapter II, Comment #43 of this report.
For those environmental analyses dependent primarily on program area, no re-analysis has been conducted to reflect the reduction in overall program from the DPIR/DEIR to the FPIR/FEIR. Where program reductions have occurred, the decrease in program would not be expected to significantly alter the findings of the analyses for purposes of changing the content and extent of mitigation measures identified.

Comment #3:

Topic: Transportation

Comment: Clarify data on the background growth conditions and correct Figure 6.

Response:

In order to determine background growth conditions for transportation purposes within the Study Area at year 1996, the DPIR/DEIR relied heavily upon the projected development assumptions and resulting traffic loads at year 1998 levels presented within the Midtown Cultural District Plan (March, 1988) as prepared for the Boston Redevelopment Authority by TAMS Consultants, Inc. As stated in the DPIR/DEIR, the year 1998 volumes within the plan, minus those trips associated with the Commonwealth Center (Proposed Project) development, were assumed to reasonably estimate year 1996 No-Build traffic volume conditions. Those specific projects and their respective square footages projected to be in place by 1998 are listed in Table 17. Locations of both the background projects used in the traffic analysis and others considered throughout the report are detailed in Figure 56.

Table 17: Year 1996 No-Build Background Project Assumptions Employed for Traffic Analysis

Development	Type	New Square Footage
Parkside at Mason	Residential	31,866
Parkside East	Residential	105,401
146 Boylston Street	Mixed	83,340
Don Bosco	Residential	348,000
Park Square Pavillion	Mixed	299,987
45 Province Street	Office	147,691
90 Tremont Street	Office	102,790
Woolworth	Office	400,000
Boston Crossing (I & II)	Office/Retail	1,576,000
110-120 Tremont Street	Office	80,930
Wilbur Theatre/P-7	Office	53,000
Hinge Block	Mixed	460,000
Parcel C-4	Office/Retail	350,000
Kingston-Bedford	Office	922,485
	TOTAL	**4,961,490**

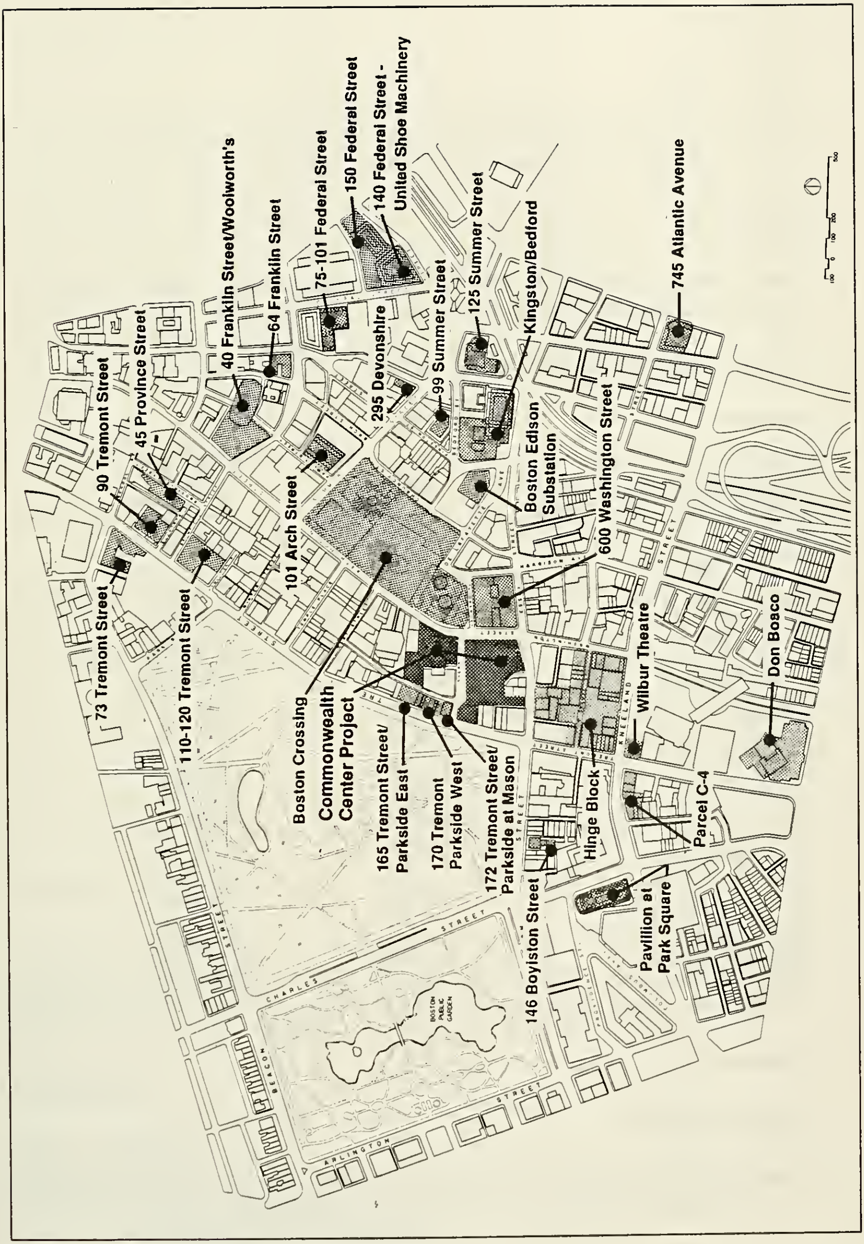


Figure 56. Year 1996 No-Build Background Projects

Comment #4:

Topic: Program

Comment: Indicate the type of uses and the program for each project listed in Figure 6.

Response:

Table 18 presents the type of use and the total program for all background projects listed in Figure 6 of the DPIR/DEIR.

Table 18: Year 1996 No-Build Background Project Assumptions

Development	Program	Type
170 Tremont Street (Parkside West)	96,000	Residential
172 Tremont Street (Parkside at Mason)	31,866	Residential
165 Tremont Street (Parkside East)	105,401	Residential
101 Arch Street	396,000	Office/Retail
99 Summer Street	260,000	Mixed Use
110-120 Tremont Street	80,930	Office
125 Summer Street	495,000	Office/Retail
600 Washington Street	480,000	Office/Retail
Pavillion at Park Street	299,987	Mixed Use
146 Boylston Street	83,340	Mixed Use
Lafayette Place/Jordan Marsh (Boston Crossing)	1,576,000	Office/Retail
Kingston/Bedford (One Lincoln)	922,485	Office
40 Franklin Street (Woolworth's)	400,000	Office
90 Tremont Street (Tremont Temple)	102,790	Office
45 Providence Street	147,691	Office
64-74 Franklin Street	77,000	Office/Retail
73 Tremont Street	282,500	Mixed Use
295 Devonshire Street	24,650	Office/Retail
140 Federal Street	285,000	Office
150 Federal Street	537,000	Mixed Use
75-101 Federal Street	565,000	Mixed Use
Parcel C-2/South Cove	146,000	Residential
Parcel R-3B/Chinatown	28,000	Residential
Parcel R-3A/Chinatown	165,585	Residential
745 Atlantic Avenue	174,875	Mixed Use
Boston Edison Substation	400,000	Office

Comment #5:

Topic: Transportation

Comment: Explain how the traffic analysis takes into account the proposed widening of Essex Street.

Response:

All future year traffic analyses within the DPIR/DEIR (Build and No-Build) were conducted in a manner which assumes the provision of two-way operations on Essex Street between the Surface Artery and Kingston Street, thus allowing westbound access to Avenue de Lafayette and reducing westbound pressure on the Stuart Street/ Kneeland Street corridor to the south of Essex Street. It should be noted that the Proposed Project's access is not contingent upon or limited by assumed Essex Street two-way operations. Instead, the two-way operations are inherent in assumptions regarding future No-Build volumes, as represented within The Midtown Cultural District Study (1988).

Comment #6:

Topic: Transportation

Comment: Elaborate upon information regarding the modal split estimates and the occupancy per car figures.

Response:

See response to EOTC Letter, Comment #3.

Comment #7:

Topic: Urban Design

Comment: Identify the viewer perspective in Figures 9, 10, 11 and 12.

Response:

The viewer perspective for all four figures is a "bird's-eye-view" from the Boston Common. A new massing perspective of the revised Proposed Project from Boston Common is included for comparison purposes and is matched to the same viewer position as Figures 9, 10, 11 and 12 in the DPIR/DEIR (see Figure 57).

Comment #8:

Topic: Construction

Comment: Provide a description of the amount and types of materials to be demolished and the method and location of disposal.

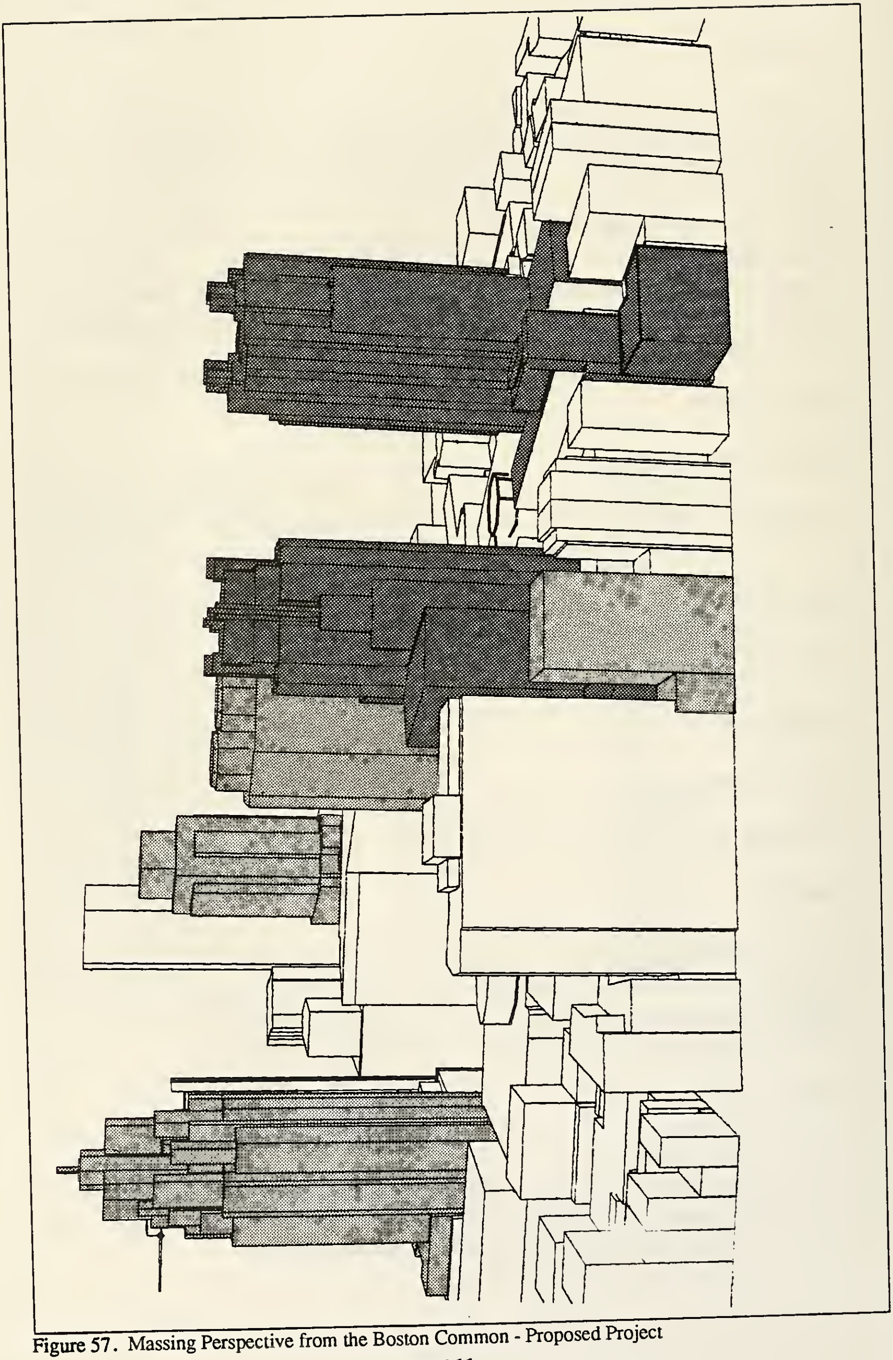


Figure 57. Massing Perspective from the Boston Common - Proposed Project

Response:

Demolition has not been awarded as of this date. The material will mostly consist of masonary wood and steel. Most demolition is expected to be done by hand or machine. The construction section of DPIR/DEIR mentions possible implosion of the Avery Hotel. This is also listed in the Summary of the FPIR/FEIR. Each prospective bidder may have a different dump site planned. However, it is anticipated that wood and steel products from demolition will be recycled, and masonry rubble will be brought to an approved landfill site.

The removal of asbestos and PCB's from any existing buildings will be awarded to a firm licensed to handle and dispose of such waste. At this time, the Proponent believes that the material will be brought to an approved site in West Virginia (this is subject to change once a final award is made).

IV. OTHER COMMENT LETTERS ON THE DPIR/DEIR AND RESPONSES

Letter #3

**MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY**

Construction Directorate
Ten Park Plaza, Boston, MA 02116

Secretary John DeVillars
Executive Office of Environmental Affairs
20th Floor
100 Cambridge Street
Boston, MA 02202

RECEIVED
JUL 13 1989
MEPA

Attention: Mr. Steve Davis
MEPA Unit

RE: EOEA File #7113
DEIR
Commonwealth Center
Boston, MA

Dear Mr. Davis:

The Massachusetts Bay Transportation Authority (MBTA) has reviewed the Draft EIR for the above referenced Commonwealth Center Project and offers the following comments:

- While the proposed project in itself may not overburden the capacity of existing facilities, the MBTA is concerned that this Project when combined with other proposed nearby projects may result in a need for additional transit capacity. The DEIR should be modified to review long-term area-wide impacts.

- Construction schedules will need to be coordinated with the MBTA's Replacement Transit Improvement Project, Phase II, given that MBTA work will occur in the vicinity of Commonwealth Center in the Boylston and Park Street Station areas.

- Planning and design will need to be closely coordinated with the MBTA for the new, enclosed station entrance for Chinatown/Southbound Station, including elevator access from street level to platform level. Construction staging plans will need to be coordinated to ensure safe, continued access to the station.

- The proposed project is adjacent to the Orange Line Chinatown Station and the Green Line Boylston Station. Since both of the stations are located at major street intersections, the proposed project should take a harder look at direct pedestrian connections. The project DEIR cites a couple of problems in making these connections, however, a more comprehensive look at the issue should be undertaken to establish the feasibility of designing these connections.

- The MBTA is currently concluding an Alternatives
Analysis/Draft Environmental Impact Report (AA/DEIR) of transit
service to the South Boston Piers area. The leading alternative
of this transit study calls for connections to the Orange Line
and the Green Line via an alignment that would follow either
Essex Street or Avery Street. Where the proposed project is
adjacent to both of these streets, the Final Environmental Impact
5 Report (FEIR) should reflect the requirement to coordinate both
the design and construction of the project with the MBTA's
transit project. In particular, any potential joint construction
activities should be identified and fully evaluated in the Final
Environmental Impact Report.

Thank you for the opportunity to review and comment on this project and should you have any questions, please do not hesitate to contact my office at 722-3489.

Sincerely,

Jane A. Chmielinski
Environmental Coordinator

JAC/lan
cc: C.B. Steward
J.C. Aiello
D.J. Kidston
J.E. Wright
V.N. Scharfenberg

IV. LETTER 3: MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Comment #1:

Topic: Transportation

Comment: Determine the need for additional transit capacity, taking into account other proposed nearby projects.

Response:

Public transportation trip estimates for the other Midtown Cultural District developments have been determined via a review of trip generation and modal split assumptions associated with each of the pending developments within the Midtown Cultural District Plan (March 1988). The assumed background developments, as enumerated in the response to Comment #3 of the executive Office of Environmental Affairs Certificate on the DPIR/DEIR, represent a total of 2,359,127 square feet of new office space, 504,769 square feet of new retail space, 944,241 square feet of new residential space, and 440,756 square feet of new hotel space. Table 19 displays a comparison of critical PM Peak Hour transit trips, by mode, for both the background developments and the Proposed Project.

Table 19: Public Transportation PM Peak Hour Estimates, by Mode, Year 1996 Build Condition

Mode	Background Development			Proposed Project			Combined Totals		
	In	Out	Total	In	Out	Total	In	Out	Total
Bus	361	2892	3253	186	668	854	547	3560	4107
Subway	281	2940	3221	247	813	1060	528	3753	4281
Train	124	701	825	94	248	342	218	949	1167
Total	**766**	**6333**	**7299**	**527**	**1729**	**2256**	**1293**	**8262**	**9555**

As Table 17 presents, the pending developments in the Midtown Cultural District, as a whole, will generate a total of 9,555 PM Peak Hour public transportation trips, of which an estimated 2,256 (or 24 percent) are projected to be generated by the Proposed Project.

A total of 4,107 inbound and outbound PM Peak Hour trips are projected to be via bus transit, 4,281 trips are to be via subway, and 1,167 trips are to be via commuter rail.

Bus Transit

A total of 3,560 new outbound PM Peak Hour bus transit trips are projected to be generated, to be dispersed among existing local and express bus routes serving the area. It is expected that increased ridership demand on these routes will be accommodated via the placement of additional buses in services on these routes by the MBTA and other private service providers.

Subway

A total of 3,753 new outbound PM Peak Hour subway transit trips are projected to be generated by all Midtown Cultural District pending developments. Approximately 1,389 trips are projected to use the Green Line and Orange line to the North, approximately 1,163 trips are projected to use the Orange Line and Red Line to the South, and approximately 1,201 are projected to use the Green Line to the west.

As described within the DPIR/DEIR, the Green Line's capacity at peak load stations is 33 percent exceeded, and the Orange Line's capacity is exceeded by approximately 22 percent. Ongoing MBTA programs to extend all station platforms at Red and Orange Line stations to accommodate six-care trains, and to expand Green Line capacity by adding approximately 100 new cars to replace existing two-car trains with three-car trains is projected to increase Red and Orange Line capacity by approximately 30 percent, and Green Line capacity by more than 60 percent.

Commuter Rail

A total of 949 new outbound commuter rail trips during the PM Peak Hour are projected to be generated by the above pending development. An estimated 597 of these new commuter rail trips are expected to use rail lines served by South Station, and the remaining 352 new rail trips are expected to use rail lines served by North Station. As suggested in the DPIR/DEIR, the MBTA has an ongoing program to add commuter rail cars to existing trains, and to schedule additional trains as peak demand rises and as station capacity allows. The MBTA has recently added cars entailing approximately 5,000 new seats, and has plans to purchase additional cars entailing 10,000 new seats to meet future demand on commuter rail lines

Any residual peak demand not met by the above planned and implemented measures is expected to be met by employer and business operations' implementation of staggered operating hours and/or flexible employee arrival and departure times. These measures would help to alleviate the potential crush loadings within a limited amount of time in the peak hours, particularly during the PM Peak Hour immediately after 5:00 PM. A more evenly spread demand over the course of the peak hour would prove more efficient in utilizing total capacity during that time.

Comment #2:

Topic: Construction

Comment: Coordinate construction schedules with the MBTA's Replacement Transit Improvement Project, Phase II.

Response:

Every reasonable effort will be made on the part of the Project Proponent to coordinate the construction of Phase I of the Proposed Project on Parcel 30 with the construction of the MBTA's Replacement Transit Improvement Project, Phase II. The Project Proponent expects to submit a construction schedule as part of the Construction Management Plan section of the Transportation Access Plan agreement with the City of Boston Transportation Department(BTD) and the Boston Redevelopment Authority(BRA).

Comment #3:

Topic: Urban Design/Construction

Comment: Coordinate planning and design and construction staging plans with the MBTA for the new, enclosed station entrance for Chinatown/Southbound Station, including elevator access from street level to platform level.

Response:

In keeping with the general intent of the Midtown Cultural District Plan to enhance the "pedestrian-oriented streets" and to develop "attractive pedestrian ways", the upper stair section of the outbound station entry to the Orange Line Chinatown Station has been relocated from its existing position. Specifically, the reconfiguration of this station will provide more direct access to the Project's interior pedestrian ways, and concurrently, more continuous retail activity wrapping the corner of the base of the south tower at the Boylston/Washington Street intersection. The existing temporary shell entrance on Boylston Street will be replaced by a permanent enclosure as part of the entry loggia to the Parcel 30 office building lobby (see Figure 10). In addition, the Project Proponent has cooperated with the MBTA to identify possible optional locations for the MBTA elevator access from street level to the platform level of the Orange Line Chinatown/Southbound Station, within the Project. The preferred location for this elevator appears in Figure 12. The Project Proponent will continue to work with the MBTA during successive stages of the design and construction process to ensure coordination with the MBTA's station improvements.

Comment #4:

Topic: Urban Design

Comment: Discuss the feasibility of designing pedestrian connections to the Orange Line/Chinatown and the Green Line/Boylston Stations.

Response:

The upper section of the entry to the outbound Orange Line Chinatown Station has been relocated from its present position to provide a pedestrian connection into the Proposed Project (see Figure 10). This entry is now under cover in the entry loggia to the Parcel 30 office building. Subsurface connections between outbound and inbound stations are not currently being considered due to the relative difference in elevations of inbound and outbound tunnels making the only crossing possible below the track levels. A previous such connection within this station has been closed due to security risks. No entry has been designed for connection of the Proposed Project to either the present Green Line Boylston Street Station, or to the future planned station expansion as part of the MBTA's Replacement Transit Improvement Project. A possible location for this entry connection has been identified at the ground floor of the Project in the retail area along Tremont Street adjacent to the Evans House (see Figure 12). The Project Proponent will continue to work with the MBTA in coordinating the ongoing MBTA planning for this station entry with plans for the Project. Due to the location of the possible future entry within the Piano Row National Register Historic District, the exterior design of this station on Tremont Street may require the review and approval of the Boston Landmark Commission and the Massachusetts Historical Commission.

Comment #5:

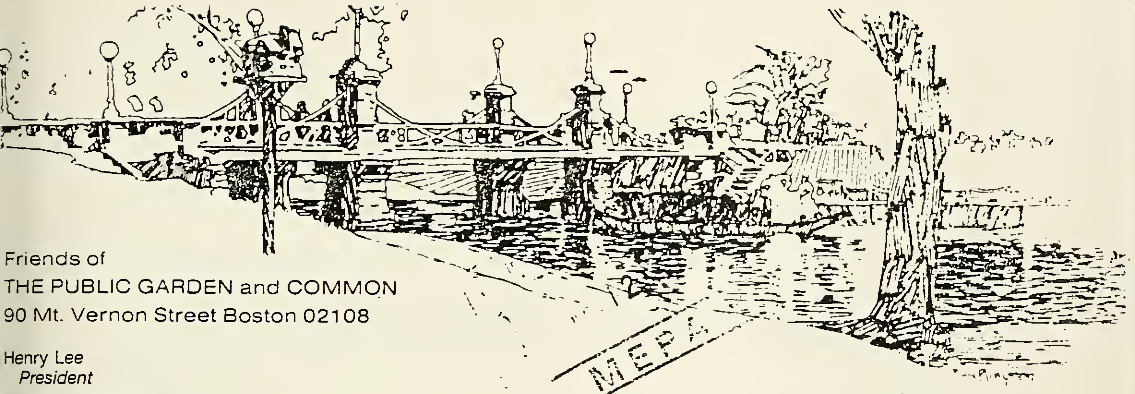
Topic: General

Comment: Coordinate design and construction of the project with the MBTA's South Boston Piers transit project and identify joint construction activities.

Response:

In meetings held with the MBTA to discuss the Fort Point Channel Area and South Boston Piers Transit Project, two possible options for a new subway tunnel and station location in the proximity of the Project have been discussed; one that follows Essex and Boylston Streets, and the other that follows Hayward and Avery Streets. In anticipation of the possible MBTA tunnel location in Avery Street, the Project Proponent has abandoned possible plans to provide an underground link under Avery Street between Phase I and Phase II of the Project. In constructing the Project's foundation and earth retention system along Avery Street, the Project Proponent will coordinate the design and planning of this system with plans for possible MBTA tunnel and station locations, and once MBTA plans have been finalized, identify opportunities for possible joint construction activities.

Letter #4



Friends of
THE PUBLIC GARDEN and COMMON
90 Mt. Vernon Street Boston 02108

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Mrs. William B. Trafford
Vice-President
Richard G. Scheide
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Mrs. John D. Harmer
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Honorary Directors
Mrs. Donald C. McKay
Edward A. Weeks

MEPA

July 10, 1989

Secretary John P. DeVillars
Executive Office of Environmental Affairs
100 Cambridge St.
Boston, MA 02201

Dear Secretary DeVillars:

The Friends of the Public Garden and Common have voiced during the past months deep concern over the shadow and visual impacts on the Common envisaged in the Commonwealth Center project. This concern remains, but within the scope of the buildings as described in the Midtown Cultural District Plan steps have been taken that reduce appreciably their environmental threat to our city's principal green space.

We believe that the limits placed on the amount and duration of shadows on the Common as set forth in the new article 38 of the district zoning law afford the park a vital measure of protection. In addition, the re-configuration of the two Commonwealth towers has produced, so far as they affect the Common, a reduction in their bulk and mass.

Article 38 calls for an upper limit of 400 feet on buildings in this location. However, owing to the shadow limits and slimmer profiles, we do not believe the proposed increase in heights from 375 and 400 feet (in the MEPA record) to 400 and 403 feet will create any additional adverse effect on the Common. Three feet over the zoning maximum is an increase of less than one percent, which we feel is in substantial accord with the new zoning article.

Sincerely yours,

Henry Lee

Henry Lee

cc: Comm. Center
S.Coyle, BRA
L. Dwyer, P&R Dept.

LETTER 4: FRIENDS OF THE PUBLIC GARDEN AND COMMON

Comment #1:

Topic: General

Comment: Steps have been taken that reduce the environmental threat to the City's principal green space.

Response:

No response warranted.

Letter #5

**Boston Water and
Sewer Commission**

425 Summer Street
Boston, MA 02210-1700
617-330-9400
Fax 617-330-5167

July 6, 1989

10 1989
MEPA

Secretary John P. DeVillars
Executive Office of Environmental Affairs
100 Cambridge Street, 20th Floor
Boston, Massachusetts 02202

Attention: MEPA Unit

Re: Commonwealth Center DEIR
EOEA #7113

Dear Secretary DeVillars:

The Commission has reviewed the Draft Project and Environmental Impact Report submitted for Commonwealth Center. We have several concerns regarding the project and therefore request that the Final Environmental Impact Report (FEIR) include the items listed below.

1 1. Analyze the opportunities to separate combined sewers in the vicinity of the project. Coordinate this analysis with the utility engineers for the Boston Crossing and the Kingston-Bedford-Essex-Streets Projects.

2 2. Provide a plan of existing water, sewer and drain lines, including existing water and sewer connections.

3 3. A plan and discussion of proposed water, sewer and drain abandonments, relocations and new lines as well as proposed water and sewer connections should be probided.

4 4. Seasonal cooling tower water blowdown should be included in the sanitary flow estimate.

5 5. Evaluate the impact of this project on the New East Side Interceptor.

Thank you for the opportunity to comment on this project.

Yours truly,

John P. Sullivan, Jr., P.E.
Chief Engineer

JPS/PK/mo

cc: Alexander C. Twining,
Commonwealth Center Limited Partnership
William Whitney, BRA
Stephan Shea, BWSC

LETTER 5: BOSTON WATER AND SEWER COMMISSION

Comment #1:

Topic: Infrastructure

Comment: Analyze the opportunities to separate combined sewers in the vicinity of the project in coordination with Boston Crossing and the Kingston-Bedford (One Lincoln Street) projects.

Response:

The Project Proponent has been in extensive contact with representatives of both the Boston Crossing and One Lincoln Street Projects. No discussions of substance have taken place with the Parkside developers as their development is currently in bankruptcy, Chapter 11 proceedings. According to the Boston Redevelopment Authority, the Parkside projects have all either been fully approved or conditionally approved.

Analyses of infrastructure improvements/alterations to the storm and sanitary sewer systems in the vicinity of the project sites have been presented to the Boston Water and Sewer Commission by the several developers. The Commission is currently reviewing the information. As of this time, no program for implementation of infrastructure improvements has been proposed.

All primary connections to the storm and sanitary systems will be made in conformance with BWSC standards. These standards required all new sewers to be installed separately in a manner that is conducive to main line system separation.

Comment #2:

Topic: Infrastructure

Comment: Provide a plan of existing water, sewer, and drain lines including existing water and sewer connections.

Response:

See Figure 58.

Comment #3:

Topic: Infrastructure

Comment: Provide a plan and discussion of proposed water, sewer and drain abandonments, relocation and new lines as well as proposed water and sewer connections.

Response:

All work required for water, sewer and drain abandonments, relocations and new lines as well as proposed connections will be performed in conformance with the standards of the Boston Water and Sewer Commission (BWSC). The location, design and construction of the new connections shall be subject to the review and approval of the BWSC. The following is a list of tentative connection locations are presented to the Commission for their review:

Domestic Water Service
- Boylston Street: New 8" service from existing 12" Southern Low service main.
- Avery Street: New 8" service from existing 12" Southern High service main.

Fire Service
- Boylston Street: New 10" fire service pipe from existing 16" Southern High service main.
- Avery Street: New 10" fire service pipe from existing 12" Southern Hig service main.

Sanitary Sewers
- Boylston Street: New 12" sanitary sewer to existing 24" combined sewer.
- Washington Street: New 8" sanitary sewer to existing 24" combined sewer.
- Avery Street: New 12" sanitary sewer to existing 12" combined sewer.

Storm Sewers
- Boylston Street: New 12" storm sewer to existing 24" combined sewer.
- Washington Street: New 12" storm sewer to existing 24" combined sewer.
- Avery Street: New 10" and new 12" storm sewers to existing 12" combined sewer.

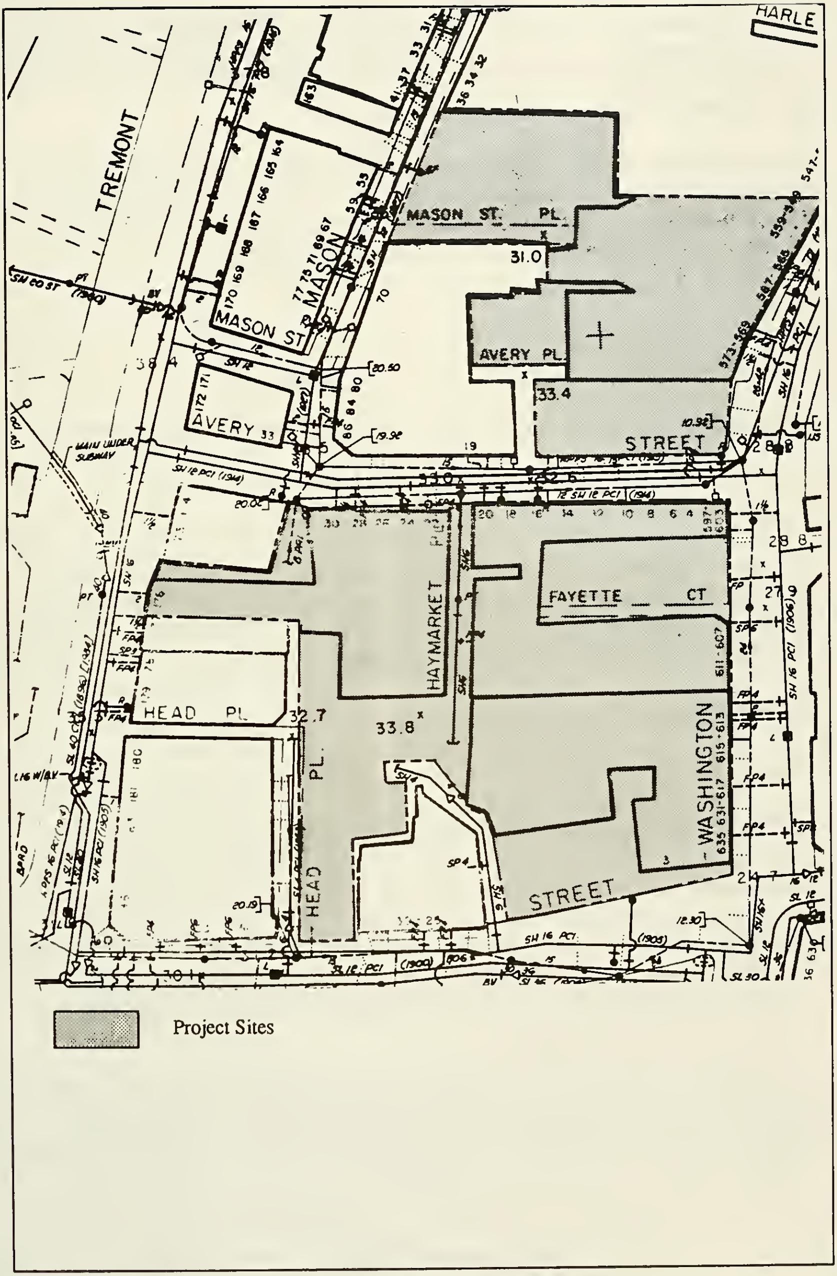


Figure 58. Existing Water, Sewer and Drain Lines and Connections

These connections, shown in Figure 55, are general in nature and are not intended to specify the exact location of the tie-ins. Both storm and sanitary sewer connections are subject to change following the outcome of a system separation analysis which is currently on-going.

All work shall be properly sequenced to minimize impacts on existing customers. Services to the site shall be maintained throughout construction as necessary to satisfy both construction needs and fire requirements. Proposed phasing will be submitted to the Commission for their review and approval.

Comment #4:

Topic: Infrastructure

Comment: Include the seasonal cooling tower water blowdown in the sanitary flow estimate.

Response:

Seasonal cooling tower blowdown equals 38,000 gpd on the maximum day. The resultant peak sanitary sewage volume as a result of the Proposed Project is approximately 218,000 gpd. This increase in volume does not significantly affect the capacity analysis previously presented in the DPIR/DEIR.

Comment #5:

Topic: Infrastructure

Comment: Evaluate the impact of this project on the new East Side Interceptor.

Response:

The flow increase to the new East Side Interceptor (ESI) resulting from the Proposed Project is approximately 218,000 gpd. This flow increase results from sanitary sewage produced by the project on the maximum day. Storm drainage from the site is currently tributary to the ESI.

The capacity of the ESI upstream of our discharge point is approximately 42 mgd. Flows from the Proposed Project will require four-tenths of one percent of the existing upstream ESI capacity. This represents a relatively insignificant of increase in flow.

Letter #6

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Division of Air Quality Control
One Winter Street, Boston 02108

RECEIVE
JUL 10 1989
MEPA

MEMORANDUM

TO: Secretary DeVillars - Executive Office of Environmental Affairs

ATTENTION: Jacki Wilkins - MEPA Unit

THRU: Christine Kirby - Division of Air Qulity Control

FROM: Gary Idleburg - Division of Air Quality Control

DATE: July 10, 1989

SUBJECT: EOEA #7113 - Commonwealth Center - Boston, MA

The Division of Air Quality Control (DAQC) has received and reviewed the Draft Environmental Impact Report for the Commonwealth Center Project. Based on this review the DAQC offers the following comments:

1) The proponent has consulted with the DAQC to establish parameters and inputs for an air quality analysis.

2) According to the summary of air quality analyses, the intersection of Park Street/Tremont Street is in exceedance of National Ambient air Quality Standards (NAAQS). The intersection was modelled and showed an eight hour carbon monoxide (CO) concentration of 8.8 ppm. The DAQC considers any concentration above 8.5 ppm to be an exceedance of the National Ambient Air Quality Standards (NAAQS) due to the possibility of computer modeling variability. This policy is per 1982 State Implementation Plan (SIP) guidance.

The proponent has not yet documented how the mitigation plans will improve traffic conditions and subsequent Level of Service (LOS) grades and air quality. More specifically, in the Final Environmental Impact Report, the proponent should present documentation showing that mitigation measures will be improving and not aggravating current conditions at the Tremont Street/Park Street intersection, as it is the only one in exceedance of NAAQS. Otherwise, it does not appear that there will be any further significant deterioration of local traffic conditions and subsequent ambient air quality.

If you have any questions please call Gary Idleburg at (617) 556-1032.

GI/df

cc: James Neely, DAQC - Boston Office
DAQC - Northeast Region
Boston Redevelopment Authority
Metropolitan Area Planning Council
Massachusetts Department of Public Works

LETTER 6: EOEA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FORMER DEQE), DIVISION OF AIR QUALITY CONTROL

Comment #1:

Topic: Air Quality

Comment: Present documentation showing that the mitigation measures will improve and not aggravate current pedestrian conditions at the Tremont Street/Park Street intersection.

Response:

In response to the memorandum from Gary Idleburg of DEP (formerly Department of Environmental Quality Engineering) dated July 10, 1989, the intersection of Tremont and Park Streets has been reanalyzed. Originally, the analysis presented in the Draft document was conservatively analyzed by assuming that the vehicles on Tremont Street north of the intersection back up during the signal red time only in one lane. However, the vehicle queue for the through movement is spread into two, 12-foot travel lanes. This condition was analyzed for 1996 Build one and eight hour conditions. This further refinement to the air analysis shows compliance with the National Ambient Air Quality Standards. The data input and output for the 1996 Build one and eight hour conditions are presented in the air quality section of the Technical Appendix. It should be noted, also, that there was an adjustment made to the build trips generated by the Proposed Project also reflected in this analysis.

The pedestrian phase was not changed in the present analysis due to the lower levels of CO. Therefore, pedestrian Levels of Service at the intersection of Tremont and Park Streets will be the same as presented in the DPIR/DEIR.

Letter #7

MASSACHUSETTS WATER RESOURCES AUTHORITY
Charlestown Navy Yard
100 First Avenue
Boston, Massachusetts 02129

Telephone:
(617) 242-6000

RECEIVED
1989
MEPA

Board of Directors
John P. DeVillars, Chairman
John J. Carroll
Robert J. Ciolek
William A. Darity
Lorraine M. Downey
Anthony V. Fletcher
Charles Lyons
Joseph A. MacRitchie
Samuel G. Mygatt
Thomas E. Reilly, Jr.
Walter J. Ryan, Jr.

Executive Director
Paul F. Levy

July 7, 1989

John P. DeVillars, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Attn: MEPA Unit

Re: EOEA No. 7113-Commonwealth Ctr., Boston-DEIR

Dear Secretary DeVillars:

Concerning the above-referenced Draft Environmental Impact Report (DEIR), we submit the following comments:

The proposed project will significantly increase wastewater
flows to the Boston and MWRA Sewer systems and the Deer
Island Wastewater Treatment Facility, which currently lack
sufficient capacity to convey and treat wastewater flows
without chronic surcharging and overflowing, especially
during wet weather The project proponent argues that
180,000 gpd is insignificant compared with the total flow
to Deer Island. However, as several projects are being
proposed simultaneously, the cumulative flow will be
significant. Therefore, all proponents of new projects are
encouraged to offset the flows contributed by their
1 projects, if at all possible. The proponent should
investigate whether or not the Boston Water & Sewer
Commission has plans for infiltration/inflow reduction in
which the proponent can participate.

On page 395, the proponent states that the existing
combined sewer has sufficient capacity to handle wastewater
from the proposed project and any future development within
2 the tributary area. Does this hold true during rainfall
events as well? In any case, sanitary and storm flows
generated by the project should be conveyed separately as
3 far as possible. The proponent should coordinate with the
Boston Water & Sewer Commission on this.

4 On page 396, the worst case flow is given as 878,000 gpd.
According to Table 44, the flow is 888,200 gpd [(a) + (d)].
Which is correct?

We appreciate the opportunity to comment. Should you have any questions, please do not hesitate to call me at (617)241-6238.

Very truly yours,

Katina Belezos, Project Engineer
Tech Support Unit
Wastewater Engineering

KB:bf/T31-191.DOC

LETTER 7: MASSACHUSETTS WATER RESOURCE AUTHORITY

Comment #1:

Topic: Infrastructure

Comment: Investigate whether or not the Boston Water and Sewer Commission has plans for infiltration/inflow reduction in which the Proponent can participate.

Response:

The Boston Water and Sewer Commission does not ask developers to participate in their inflow/infiltration program in locations where combined systems are in operation. The Commission instead requests that developers evaluate separation as a means of removing inflow in combined sewer areas. A separation analysis is currently under way.

Comment #2:

Topic: Infrastructure

Comment: Explain whether the existing combined sewer has sufficient capacity to handle waste water from this project and any future development within the tributary area during rainfall events.

Response:

The existing combined sewer has sufficient capacity to handle waste water generated from the Proposed Project and future development within the tributary area as well as runoff during rainfall events. See Table 42, page 391-392 of the DPIR/DEIR.

Comment #3

Topic: Infrastructure

Comment: Coordinate with Boston Water and Sewer Commission in conveying sanitary and storm flows separately.

Response:

The Proponent is currently analyzing opportunities for separation of the storm and sanitary sewers in the vicinity of the project site at the request of the Boston Water and Sewer Commission (see Letter 1: Comment #62 response).

Comment #4:

Topic: Infrastructure

Comment: Correct inconsistencies in the worst case flow on page 396 and Table 44.

Response:

The correct flow is 888,200 gpd.

Letter #8

E.O.T.C. # 89-0254

The Commonwealth of Massachusetts
Executive Office of Transportation & Construction
Office of the Secretary
10 Park Plaza, Room 3510
Boston, MA 02116-3969
Telephone 973-7000
TDD (617) 973-7306

Michael S. Dukakis
Governor
Frederick P. Salvucci
Secretary
and
M.B.T.A. Chairman

( ) E.N.F. (X) DRAFT E.I.R. ( ) FINAL E.I.R. No.: 7113

DATE: 06-12-89 DATE RECEIVED: 06-12-89 COMMENTS DUE: 7-10-89

TOWN/CITY: BOSTON, MASSACHUSETTS

PROJECT PROPONENT:
COMMONWEALTH CENTER LIMITED PARTNERSHIP
171 MILK STREET
SUITE # 401
BOSTON, MASSACHUSETTS 02109

PROJECT DESCRIPTION: COMMONWEALTH CENTER, WASHINGTON STREET/MIDTOWN CULTURAL DISTRICT, BOSTON, MASSACHUSETTS. The proposed is the construction of approximately 2.0 million G.S.F. mixed use development on portions of two city blocks. The primary site is known as Parcel # 30 and is comprised of two-thirds of the block bounded by Tremont Street, Boylston, Avery and Washington Streets. The second site, the Keith Block is an irregular corner site bounded by Washington, Avery and Mason Streets.

( ) COMMENTS (SEE ATTACHED) ( ) NO COMMENTS

DATE: 7/10/89 for

The Commonwealth of Massachusetts
Executive Office of Transportation & Construction
Office of the Secretary
10 Park Plaza, Room 3510
Boston, MA 02116-3969
Telephone 973-7000
TDD (617) 973-7306

Michael S. Dukakis
Governor
Frederick P. Salvucci
Secretary
and
M.B.T.A. Chairman

EOTC COMMENTS ON DEIR COMMONWEALTH CENTER
BOSTON, MA
EOEA #7113

EOTC has reviewed the DEIR for the Commonwealth Center mixed-use development project in Boston. The proposed project is the construction of approximately 2.0 million gross square feet. This development consists of 1.477 million square feet of office, 162 thousand square feet of retail space and a 414 room hotel. The project will be developed on two parcels. The primary site known as parcel #30 is bounded by Tremont, Boylston, Avery and Washington Streets. The second site is bounded by Washington, Avery and Mason Streets.

1 EOTC is pleased to see the level of commitment from the proponent in using transportation demand management to reduce the number of vehicle trips to the site. In the FEIR the proponent should further detail the measures to be taken. This should include a proposed schedule for the shuttle service from the site to Logan Airport, a commitment to the number of parking spaces to be alloted to van pool and car pool parking, as well as the measures to be taken to carry out the proposed subsidization of employees' public transportation costs. Because of the size of this project and the number of new employees, approximately 6,300, the development should designate a full-time staff member as the transportation coordinator. This staff member could serve as the coordinator of all transportation related questions and could be the contact person with the MBTA as well as Caravan for Commuters.

2 Because of the number of large-scale projects proposed for this area, the proponent should participate in the forming of a Transportation Management Organization (TMO) for the Midtown Cultural District. Among the other development projects who should be included in this TMO are the Kingston-Bedford-Essex project, Lafayette Place II, Woolworth's and Pavilion at Park Square.

3 In developing the trip generation rates for autos the proponent has used a vehicle occupancy factor of 1.8 for office use. This rate appears to be too high considering the type of development and its location. The 1980 U. S. Census

Journey-to-Work figures suggest a rate of 1.32 for office space in this district. This difference in occupancy per car leads to a possible undercounting of approximately 900 vehicles per day to the site. The FEIR should correct this under counting of vehicle trips generated. The FEIR should also contain a discussion on the Modal Split Estimates contained in Table 10 of the DEIR. Among the questions to be resolved should be an elaboration of the mode split for the cultural space. The estimate of 48.3% of patrons arriving by walking appears high. The discussion on the hotel mode split should break out how much of the transit split is public transit and how much is Commonwealth Center's shuttle service to Logan.

The project proposal is to provide 1,000 parking spaces. 200 spaces will be reserved for the hotel and the remaining 800 will be self-park spaces for the retail and office space at the site. Of these 800 spaces, 600 are long-term and 200 are short-term spaces. The FEIR should contain a discussion on how these proposed parking spaces will fit under the current City of Boston Parking Freeze. Under the existing freeze if these spaces are subject to hourly or daily charges then they would be included in the freeze and be subject to approval from the Air Pollution Control Commission of the City of Boston. A letter of determination from the City of Boston should accompany the FEIR as well as a table in the FEIR detailing which parking spaces are exempt and which are non-exempt.

The FEIR should include an updated discussion of the MBTA's South Boston Piers/Fort Point Channel Area Transit Study and how this proposed transit line will impact Commonwealth Center. If possible, the FEIR should show design plans for the proposed direct connection from the project site to the new transit line.

This project is sited in an excellent location to take advantage of the existing and proposed transit lines running thru the Midtown Cultural District. With this project the developers have the potential to design the integration of the transit lines with the project in an architecturally significant way. This integration of the architectural design will serve to accentuate the transit potentials available as well as enhance the Midtown Cultural District as a whole. A good example of outstanding design incorporating space and transit is the Place ville Marie located in Montreal. A discussion of the interface between the project and the current and proposed transit lines should be provided in the FEIR.

The proponent listed three intersections in need of
improvements. In deciding upon the proper mitigation measures
necessary, the proponent should coordinate with the
Kingston-Bedford-Essex Development project (EOEA #6132) and the
10 City of Boston. Included in this section should be a discussion
of the proposed City of Boston project to widen Essex Street.
The proposed improvements to Essex Street/Surface Artery/Lincoln
Steet will only improve the intersection to LOS E in the PM
11 peak. The proponent should explore measures to improve this
intesection to an acceptable level of service. The proponent
should make firm financial commitments for the proposed
12 mitigation measures.

07/07/89

LETTER 8: EXECUTIVE OFFICE OF TRANSPORTATION AND CONSTRUCTION

Comment #1:

Topic: Transportation

Comment: Discuss in further detail the measures to be taken to reduce the number of vehicle trips to the site.

Response:

Through the Midtown Developers' Transportation Management Association (MDTMA) described in the response to Comment #2 below, the following measures will be taken by the Proponent to reduce vehicle trips to the site:

1) Provisions will be made for the sale of MBTA passes and tokens within the lobbies of the Commonwealth Center buildings.

2) Establishment of a commuter center to distribute area-specific commute management materials.

3) Installation of an on-site computer ride sharing matching system with which to provide commuters to the site up-to-date commute opportunity information.

4) Exploration of a coordinated alternative work hour program (flex-time, staggered hours, extended hours) among all MDTMA member employers (all on-site employers with 50 or more employees).

5) Exploration of a coordinated program among MDTMA member employers to subsidize employee public transportation costs.

6) Provision of a van service between the development's proposed hotel and Logan International Airport on a schedule of one round trip per hour (or as needed) between the hours of 7:00 AM and 7:00 PM.

7) Provision of specific parking spaces within the development's garage for employee vanpools and carpools (see figure 20).

Comment #2:

Topic: Transportation

Comment: Participate in the formulation of a Transportation Management Association (TMA) for the Midtown Cultural District.

Response:

The proponent is committed to participation in a Transportation Management Association (TMA) which will be formed among the Proponent of various development projects proposed for the Midtown Cultural District and adjoining neighborhoods, specifically, the Proponent of the Commonwealth Center, Boston Crossing and One Lincoln Street developments.

The Project Proponent has met informally with the proponents of Boston Crossing and One Lincoln Street to formulate the basic objectives, goals and preliminary demand reduction strategies for a TMA.

The TMA, known as the Midtown Developers' Transportation Management Association (MDTMA) will be organized to maximize access to and optimize mobility within the development area of these projects. The stated goals and objectives of the MDTMA are:

1) To establish a partnership to study and implement creative solutions to the transportation issues facing the area served by the MDTMA.

2) To implement a plan to manage and coordinate construction activities for Commonwealth Center, Boston Crossing and One Lincoln Street.

3) To implement appropriate transportation demand strategies that reduce the number of single occupancy vehicles travelling through the area during the peak traffic periods.

4) To create a central information clearinghouse for employers, developers and residents providing information regarding commute options, MDTMA services and local transportation issues and programs.

5) To develop awareness and commitment to the long-term support of the MDTMA.

Comment #3:

Topic: Transportation

Comment: Correct the under counting of vehicle trips generated by the project.

Response:

As described within the DPIR/DEIR, vehicle occupancy factors employed were as recommended within the Midtown Cultural District Study (March, 1988). A subsequent review of U.S. Census Journey-to-Work data (1980) allows a comparison between the vehicle occupancy factors employed in the DPIR/DEIR for office uses and those reflected in the U.S. Census data for Zone 3 of the Downtown Boston area which includes the Commonwealth Center site. The Journey-to-Work data suggests a vehicle occupancy rate for Zone 3 of 1.59, versus the 1.80 rate recommended within the Midtown Cultural District Study and employed in the DPIR/DEIR. The lower vehicle occupancy rate results in a total of 311 additional vehicle trips on a daily basis for the Proposed Project, and an additional 58 and 52 vehicle trips in the AM peak hour and PM peak hour, respectively. All traffic analysis included in this FPIR/FEIR use the 1.59 vehicle occupancy rate for office space in the Proposed Project. Vehicle occupancy rates for other land uses within the Proposed Project remain unaltered from the DPIR/DEIR. It should be noted that the 1.59 vehicle occupancy rate for office space compares favorably with the 1.60 vehicle occupancy rate for office space used within the DPIR/DEIR for Boston Crossing (EOEA #6929, July, 1989), and the 1.64 vehicle occupancy rate for office space employed within the DEIR for the One Lincoln Street (Kingston-Bedford-Essex) Street Development (EOEA #6132, March, 1989).

Comment #4:

Topic: Transportation

Comment: Elaborate upon the modal split for the cultural space.

Response:

The DPIR/DEIR's modal split estimates for cultural space were developed via employment of a modal split equation developed as part of the Third Harbor Tunnel/ Central Artery environmental documentation. The DPIR/DEIR, however, incorrectly reported the appropriate percentages of person trips by mode in Table 10 for cultural uses through a transposition of the correct percentage assumptions. The correct percentages of person trips by mode for cultural uses is presented in Table 20.

Table 20: Modal Split Estimates

	Percentage of Person Trips by Mode		
Land Use	**Auto**	**Transit**	**Walk**
Cultural	48.3	37.4	14.3

Table 21 presents a revision to the DPIR/DEIR's Table 12, Modal Trip Estimates for Proposed Project, reflecting the above revised cultural modal split percentages, and also the revised vehicle occupancy factor of 1.59 for the office uses within the Proposed Project.

Table 21: Modal Trip Estimates - Proposed Project

	Daily	**AM Peak Hour**			**PM Peak Hour**		
Land Use	**Trips**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Office							
Autos	2,664	427	63	490	71	378	449
Walk	752	121	18	139	20	107	127
Bus	4,166	668	98	766	111	591	702
Subway	4,450	713	105	818	118	632	750
Train	852	37	20	157	23	121	144
Subtotal	12,884	2,066	304	2,370	343	1,829	2,172
Retail							
Autos	942	18	0	18	72	144	216
Walk	1,598	31	0	31	122	244	366
Bus	766	3	0	3	12	24	36
Subway	819	16	0	16	63	124	187
Train	157	15	0	15	58	116	174
Subtotal	4,282	83	0	83	327	652	979
Hotel							
Autos	1,608	108	113	221	170	138	308
Walk	865	58	61	119	91	74	165
Bus	407	6	6	12	43	35	78
Subway	435	29	30	59	46	37	83
Train	83	27	28	55	9	7	16
Subtotal	13,398	228	238	466	359	291	650
Theater							
Autos	510	20	6	26	36	34	70
Walk	242	9	3	12	17	16	33
Bus	278	11	3	14	20	18	38
Subway	297	12	3	15	20	20	40
Train	57	2	1	3	4	4	8

Subtotal	1,384	54	16	70	97	92	189
Total	**21,948**	**2,431**	**558**	**2,989**	**1,126**	**2,864**	**3,990**

Table 21 presents total trips which are approximately one percent higher on a daily basis, and approximately two percent higher during the AM peak hour and one percent higher during the PM Peak Hour than total trips related to the Proposed Project in the DPIR/DEIR. Of these total trips, auto trips in Table 18 are approximately eight percent higher on a daily basis, and between seven and nine percent on a peak hour basis than those trips as reported in the DPIR/DEIR.

Comment #5:

Topic: Transportation

Comment: Break down the hotel modal split and determine how much of the transit split is public transit and how much is project shuttle service to Logan.

Response:

The hotel modal split is detailed in Table 21. Services originating or terminating at Logan Airport account for approximately four to five percent of all hotel-retail related peak hour trips. The proposed hotel shuttle service to Logan International Airport, assuming one roundtrip of a ten to twelve-passenger van during the peak hour, is projected to provide service to a maximum of 20 to 25 individuals during either peak hour. It is assumed that these shuttle trips will represent trips which would otherwise be made by taxi or rental car, rather than by other forms of transit, and thus the airport shuttle service from the hotel will act as disincentive to use these private or semi-private auto modes of access to the site.

Comment #6:

Topic: Transportation

Comment: Discuss the proposed parking spaces under the current City of Boston parking freeze.

Response:

The Proponent has applied to the Boston Air Pollution Control Commission for a Parking Freeze Permit covering 341 commercial spaces within the development's parking facility to be located in the subgrade area of the Parcel 30 building. The 341 commercial spaces represent the total commercial spaces extant in open lots on the site, which are to be displaced by the Proposed Project. These 341 spaces are to be available for self-parking at market rates on a 24-hour basis seven days a week. The remaining 659 spaces (600 reserved for office tenants, and 59 reserved for hotel use) will be spaces for office tenants and hotel guests. All access and egress to the parking facility will be at a point on Boylston Street approximately mid-way between Tremont and Washington Streets. Access to the facility will be controlled by a combination of card keys for regular office tenant users; and an attendant for retail patrons, visitors, and hotel guests. The 341 commercial replacement parking spaces in the parking facility will constitute the non-exempt spaces, and the 659 spaces will constitute the exempt spaces within the City of Boston Parking Freeze.

Comment #7:

Topic: Transportation

Comment: Attach a Letter of Determination from the City of Boston and include a table detailing which parking spaces are exempt and which are non-exempt.

Response:

Table 22 details the proposed program allocation of exempt and non-exempt spaces which is under review by the Boston Air Pollution Control Commission (BAPCC). All analyses of effects have been completed based on this allocation. This Table represents a maximum parking program, and mitigation measures concerned with vehicular transportation and parking, noise and vehicular emissions are identified in Chapter II, Comments #1 through #15, #25 through #29 and #32 through #38 of the FPIR/FEIR. Once a final determination is made by the BAPCC, these mitigation measures will be employed to reduce the environmental effects that exceed acceptable levels. These mitigation measures, together with annual monitoring measures will form the basis of the Transportation Access Plan to be filed with the City of Boston. A copy of the BAPCC application filed by the Project Proponent appears in the Appendix.

Table 22: Parking Space Allocation

Space Use Designation	Exempt Spaces	Non-Exempt Spaces
Office Tenants	600	—
Hotel Guests	59	—
Commercial Spaces	—	341
Total	**659**	**341**

Comment #8:

Topic: Transportation

Comment: Include discussion of MBTA's South Boston Piers/Fort Point Channel Area Transit Study and plans for the proposed direct connection from the project to the new transit line.

Response:

In meetings held with the MBTA to discuss the Fort Point Channel Area and South Boston Piers transit alternatives project, two possible options of a new subway tunnel and station location proximate to the Project have been discussed; one that follows Boylston and Essex Streets, and the other that follows Avery Street and Hayward Phase to South Station. The MBTA's South Boston Piers /Fan Point Channel Transit Alternatives (September, 1989) presents as a preferred alignment for the project which introduces an underground transit way along Boylston Street and Essex Street between the Boylston Green Line Station and South Station, with potential extensions beyond South Station to Fan Pier area. Mention is made in that document of an optional alignment for the project which employs Avery Street and Avenue de Lafayette to South Station. In anticipation of the possible tunnel location in Avery Street, the Project Proponent has abandoned possible plans to provide an underground link under Avery Street between Phase I and Phase II of the Project. In constructing the Project's foundation and earth retention system along Avery Street, the Project Proponent will coordinate the design and planning of this system with plans for possible MBTA subway tunnel and station locations, and once MBTA plans have been finalized, identify opportunities for possible joint construction activities.

No entry has been designed for connection of the Proposed Project to either the present Green Line Boylston Street Station, or to the future planned station expansion as part of the new MBTA Replacement Transit Improvement Project. A possible location for this entry connection on Tremont Street has been identified at the ground floor of the Project in the retail area adjacent to the Evans House along Tremont Street (see Figure 12). The Project Proponent will continue to work with the MBTA in coordinating their ongoing MBTA planning for this station entry with plans for the Project. Due to the location of this possible future entry within the Piano Row National Register Historic District, the exterior design of this station entry on Tremont Street may require the design review and approval of the Boston Landmarks Commission and the Massachusetts Historical Commission.

Comment #9:

Topic: Transportation/Urban Design

Comment: Include a discussion of the interface between the project and the current and proposed transit lines in an architecturally significant way.

Response:

The upper section of the outbound station entry to the Orange Line Chinatown Station has been relocated from its present position in order to provide more direct access to the project's interior pedestrian ways, and to provide more continuous retail activity wrapping the corner of the base of the south tower at the Boylston/ Washington Street intersection. The existing temporary shell entrance on Boylston Street would be replaced by a permanent enclosure as part of the entry loggia to the Parcel 30 office building lobby (see Figure 10).

Comment #10:

Topic: Transportation

Comment: Include a discussion of the proposed City of Boston project to widen Essex Street.

Response:

As of this writing, the City of Boston's plans for Essex Street entail its widening between the Surface Artery and Kingston Street to provide for two-way vehicular operation and to provide direct access to the Midtown Cultural District via Avenue de Lafayette to Washington Street. Two-way operations on Essex Street will serve to provide for another westbound route to augment existing Kneeland Street, particularly upon the pending closure of westbound Beach Street at the Chinatown Gate. The proposed widening of Essex Street will necessitate property takings on the northern edge of Essex Street. It should be noted that the Proposed Project's access is not contingent upon or limited by assumed Essex street two-way operations. Instead, the two-way operations are inherent in assumptions regarding future No-Build volumes, as represented within The Midtown Cultural District Study (1988).

Comment #11:

Topic: Transportation

Comment: Explore measures to improve the Essex Street/Surface Artery/Lincoln Street intersection to an acceptable Level of Service.

Response:

Joint meetings have been held among representatives of the City of Boston Transportation Department, the Project Proponent and the proponents of Boston Crossing and One Lincoln Street developments to determine potential mitigation measures for the Essex Street/Surface Artery/Lincoln Street intersection in order to create acceptable operating conditions during peak hours at this location. The following mitigation measures have been determined to provide Levels of Service of "C/D" and "D" during the AM and PM Peak Hours, respectively:

- The Essex Street eastbound approach is widened to allow for three approach lanes (instead of the existing two lanes) in conjunction with the introduction of two-direction operations on Essex Street as far west as Kingston Street.

- The northbound Lincoln Street approach is provided for four approach lanes by virtue of parking restriction implementation on both sides of Lincoln Street.

- The southbound Surface Artery approach is widened to four lanes, in conjunction with a decrease in width to two lanes on the Surface Artery northbound approach.

- Left turns on both approaches of the Surface Artery are prohibited.

Comment #12

Topic: Transportation

Comment: Make firm financial commitments for the proposed mitigation measures.

Response:

The Project Proponent will enter into an agreement with the City of Boston to make financial commitments to the mitigation measures for which the Proponent will accept responsibility, as indicated in the Summary of Environmental Effects and Mitigation. This agreement will be part of the Project's Transportation Access Plan that will be submitted to the Boston Transportation Department following the Final Adequacy Determination of the FPIR/FEIR. Table 23 details the area-wide intersections requiring some form of mitigation indicated by the analyses of effects for the Proposed Project, Boston Crossing and One Lincoln Street projects. The table describes the level of mitigation anticipated and the proposed party or parties responsible for implementation of the mitigation itself.

The proposed allocation of responsibility is a result of preliminary discussions between the Project Proponent and the proponents of the two other projects. The Project Proponent has sought to identify those intersections which may have already been targeted for improvements as part of existing programs to meet public planning objectives, and to allocate responsibility for the remaining intersection improvements to the three developments in the area and to appropriate public agencies where some level of mitigation is indicated by unsatisfactory existing conditions.

Table 23: Proposed Mitigation for the Area-Wide Intersections

Intersection	Proposed Mitigation	Proposed Responsible Party	Estimated Completion Date
Kneeland Street/ Surface Artery	• Restripe Surface Artery • Restripe Kneeland Street • Improve signal timing and phasing	FHWA/MDPW- Urban Systems or Interstate Funding or High Hazard Elimination	1995
Hayward Place/ Avery Street/	• Realign and improve signals • Maintain 2 lanes from Hayward Place to Avery Street	MDPW/BTD- Chapter 90 Funding Commonwealth Center Boston Crossing	1994
Washington Street	• Maintain 3 lanes (1 parking, 2 travel) on Washington Street		
Kingston Street/ Bedford Street	• Signalize	MDPW/BTD- Chapter 90 Funding Commonwealth Center Boston Crossing	1993
Church Green	• Adjust Signal timing	MDPW/BTD- Chapter 90 Funding One Lincoln Street	1992
Tremont Street/ Boylston Street	• Restrict parking on Boylston Street • Restripe Boylston Street • Restripe Tremont Street • Improve signal timing and phasing	MDPW Urban Systems Commonwealth Center	1993
Washington Street/ Boylston Street	• Restrict parking on Boylston	MDPW Urban Systems	1993

	• Restripe Boylston Street • Restripe washington Street • Improve signal timing and phasing	Commonwealth Center	
Harrison Avenue Extension/Chauncy Street/Essex Street (Phillips Square)	• Restrict parking on Essex Street and Harrison Avenue Extension • Restripe Essex Street (3 lanes) • Restripe Harrison Avenue Extension(2 lanes) • Signalize	FHWA/MDPW-Urban Systems	1994
Avenue de Lafayette Essex Street/ Kingston Street	• Restrict parking on Essex Street • Restripe Essex Street (3 lanes) • Restripe Kingston Street (2 lanes) • Signalize	FHWA/MDPW-Urban Systems or High Hazard Elimination One Lincoln Street	1993
Surface Artery/ Lincoln Street/ Essex Street	• Widen Essex Street IB • Restrict parking on Lincoln St. • Widen Surface Artery SB • Prohibit left turns NB and SB • Improve signal timing and phasing	FHWA/MDPW-Urban Systems or Interstate Funding	1995
Boston Crossing Garage Entry/ Avenue de Lafayette	• Signalize	MDPW/BTD-Chapter 90 Funding Boston Crossing	1994
Boston Crossing Garage Entry/ Chauncy Street/ Bedford Street	• Signalize	MDPW/BTD-Boston Crossing	1994
Crosswalks at Tremont/Boylston, Tremont/Avery, Boylston/Washington, and Washington/Avery/Hayward	• Widen	Commonwealth Center	1993

Letter #9

RECEIVED
JUN , 0 1989
MEPA

JUN 1 6 1989

Ms. Mecky Adnani
Aasasaki Associates, Inc.
64 Pleasant Street
Watertown, Massachusetts 02172

Dear Ms. Adnani:

We have reviewed the Draft Project and Environmental Impact Report (EOEA 7113) for Commonwealth Center in Boston.

Federal Aviation Administration's (FAA) concern is with the proposed height of such development projects. In accordance with Federal Aviation Regulation Part 77, project proponents are required to file a Notice of Proposed Construction (FAA Form 7460-1) with FAA for each structure over 200 feet above ground level. This enables the FAA to evaluate the effect of the development on navigable airspace.

Please file the appropriate enclosed forms when the proposed heights are certain.

Sincerely,

"Original Signed By"

John Silva
Environmental Program Manager

Enclosure

cc: John DeVillars, Secretary, Executive Office of Environmental Affairs

LETTER 9: FEDERAL AVIATION ADMINISTRATION (FAA)

Comment #1:
Topic: Miscellaneous

Comment: File a Notice of Proposed Construction with FAA for each structure over 200 feet above ground level

Response:

Response: The Project Proponent has filed a Notice of Proposed Construction with the FAA for the two office towers over 200 feet above ground level. A copy of this Notice is included in the Technical Appendix.

Letter #10

LATE COMMENT

RECEIVED
JUL 21
MEPA

July 13, 1989

Secretary John P. DeVillars
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

ATTN: MEPA Unit

RE: Commonwealth Center, Boston, MA; EOEA #7113

file

Dear Secretary DeVillars:

Staff of the Massachusetts Historical Commission have reviewed the Draft Environmental Impact Report for the proposed project referenced above. The proposed project site includes two historic buildings, the Paramount Theatre and the Evans House which are listed in the National and State Registers of Historic Places. The project site is also adjacent to several other National and State Register properties and contains several historically significant buildings which are not presently listed in the National or State Registers. The DEIR adequately identifies and describes the historical significance of these resources.

The DEIR presents an analysis of the effects of the project on the State Register properties located within the project area and on key State Register properties adjacent to the project area. The visual, wind and shadow effects are described.

The DEIR recognizes that the Enhanced IPOD/Infill Scheme would maintain the historic character of the area and would have only minimal and beneficial effects on significant historic properties (pp. 338). However, this alternative is not the proponent's preferred project.

The preferred project includes demolition of several historic properties which are not listed in the National Register of Historic Places, but do contribute to the historic character of the area. These properties include 10 Avery Street (Avery Hotel), 605-611 Washington Street, 617 Washington Street (State Theatre) and 10 Haymarket Street. In addition, all but the Tremont and Avery Street facades of the Evans House will be demolished. The proposed project will introduce to the site two tower buildings of 31 and 27-stories and large, lower-rise buildings between 70-125 feet in height along the principal

Massachusetts Historical Commission, Valerie A. Talmage, *Executive Director, State Historic Preservation Officer*
80 Boylston Street, Boston, Massachusetts 02116 (617) 727-8470

Office of the Secretary of State, Michael J. Connolly, *Secretary*

streets. The project as proposed constitutes an adverse effect (950 CMR 71.05) by introducing new construction that is out of character with the historic properties, and by destroying a substantial part of the Evans Building.

The MHC continues to express concerns that the proposed project is out of scale with the general height, massing and historic feeling of the neighborhood. The area is noted for its low-rise, 6-12 story, late nineteenth century commercial structures. The project will introduce dramatic visual elements that are out of scale and character with the area and with the adjacent Boston Common, a National Historic Landmark. In addition, the construction of a tower over the Paramount Theatre, albeit to the rear of the building, will adversely affect the historic resource by introducing a large addition to the theatre. The MHC recommends that the heights of the towers be reevaluated so as to minimize the adverse effects to the Paramount Theatre and Boston Common. 1

The DEIR states that Evans House would be retained and rehabilitated as a measure to conserve and reinforce the historic character of the area (p. 284). However, the proposed plans for the Evans House would demolish all of the building except for two exterior walls (p. 341). The proposed plans for the Evans House, to support the facades during construction and tie the walls into the new structural system, does not meet the Secretary of Interior's "Standards for Rehabilitation." The MHC does not endorse facadism as a method of preservation as it fails to preserve and maintain the architectural and historical character of the building. The DEIR does not present any compelling arguments as to why it is not prudent or feasible to rehabilitate and reuse the Evans House. The MHC recommends that rehabilitation of the Evans House be considered more carefully, as its rehabilitation and reuse would provide for the preservation of an important historic property, and would help to mitigate the overall adverse effects of the proposed new construction to historic resources. 2

The DEIR contains a description of the results of an archaeological reconnaissance of the project area, with recommendations for archaeological test excavations in specific areas of the project. MHC notes that the archaeological report examined current utility maps of the area, in order to help assess previous disturbances to the project area. A careful evaluation of recent land use and the locations of utilities, basements and other modern features is critical in determining whether intact, significant archaeological deposits are likely to exist within an urban area and whether archaeological testing is warranted. MHC notes that utilities shown on the utility map (figure 190) as being present in the alley to the rear of the Evans House were not described in the archaeological report and testing was recommended for this highly disturbed area. This suggests that other utilities may have been overlooked. MHC requests that the utility maps of all the areas recommended for survey be carefully re-examined for evidence of previous disturbance. In addition, MHC notes that the archaeological resources which the report predicts will be located in the proposed survey areas include trash pits, privies and other cultural deposits associated with the 18th and 19th century settlement of the area. The MHC questions the likelihood that such deposits 3 4 would still be intact within Fayette Court, Avery Place and Mason Place, which were set aside as alleyways during the 19th century and are now paved. Judging from the soil boring logs (bore #S-1285 through 1288, especially), the project area has generally been characterized by cutting, rather than filling operations, which suggests that the areas recommended for archaeological testing may have been previously disturbed and thus may not warrant any further archaeological investigation. **5**

The MHC looks forward to further consultation with the project proponent in exploring prudent and feasible measures which could mitigate the project's adverse effects to significant historic properties.

These comments are offered to assist in compliance with M.G.L. Ch. 9, ss. 26-27c and MEPA.

If you have any questions, please feel free to contact Brona Simon or Maureen Cavanaugh of this office.

Sincerely,

Valerie Talmage

Valerie A. Talmage
Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission

cc: Boston Landmarks Commission
Boston Preservation Alliance
Commonwealth Center Limited Partnership
DEQE/DWPC
Howard Kielley, F.D. Rich Co.

VAT/BS/MC/kb

LETTER 10: MASSACHUSETTS HISTORIC COMMISSION

Comment #1:

Topic: Historic/Design

Comment: Reevaluate heights of the towers so as to minimize the adverse effects to the Paramount Theater and Boston Common.

Response:

The heights of both towers are in substantial accord with the maximum heights allowable under the PDA-II zoning designation for the Project site as specified under Article 38 of the Boston Zoning Code (see Chapter II, Comment #43). The north tower of the Project has been redesigned from the original version presented in the DPIR/DEIR, in order to maximize the visual and shadow effects as identified in Article 38. A discussion of this new design appears in Chapter II, Comments #41, #42, #43 and #54. Shadow impacts on the Boston Common that are generated by the Project fall within the allowable limits set by Article 38 (see Chapter II, Comment #20. In addition, the massing of the redesigned north tower impacting the Paramount Theater has been granted Conceptual Approval by the Boston Landmarks Commission (see Technical Appendix). As part of the Article 31 review process under which the Proposed Project is being reviewed by the Boston Redevelopment Authority, the schematic design of the Proposed Project will be reviewed by the Boston Landmarks Commission and the Boston Civic Design Commission.

Comment #2:

Topic: Historic/Design

Comment: Consider the rehabilitation and reuse of the Evans House more carefully.

Response:

Evaluation of alternatives for treatment of the Evans House are included in the Evans House Evaluation Report dated September 27, 1989 which is available in the

Boston Redevelopment Authority library. Three general alternatives are evaluated; the first providing for maximum rehabilitation of the existing building, the second providing for the demolition of the floors and interior structure, with retention and rehabilitation of the Avery and Tremont Street facades only, and the third alternative providing for the complete replacement of the structure with new construction compatible with the historic district character. Due to the extent of the degradation of the structure and the primary facade on Tremont Street uncovered during the building evaluation, the preferred alternative of the Project Proponent is to replace the existing building with new construction compatible with the scale and character of the Piano Row National Register Historic District. Design of this replacement building will be subject to the general standards and criteria of the Boston Landmarks Commission for an infill structure within this historic district, and the standards of the U.S. Secretary of the Interior.

Within the applicable design standards, three specific options will be explored for this replacement structure. The first is a replication of the existing design, dating to the historic period in which Avery Street was extended to Tremont Street. Historic photos of the Evans house date this to approximately 1914. The second design option retains only the existing scale and volume of the building, with a new contemporary design of the buildings elevations, using design elements and materials consistent with the adjacent historic buildings. The third option will explore a new structure with the scale, volume, fenestration and facade materials consistent with the adjacent buildings in the Piano Row National Register Historic District. The Project Proponent will review the design of this replacement building with the Massachusetts Historical Commission, the Boston Landmarks Commission, the Boston Redevelopment Authority, the Boston Preservation Alliance and the Boston Civic Design Commission.

Comment #3:

Topic: Archaeology

Comment: Examine current utility maps of the area in order to help assess previous disturbances to the project area.

Response:

Since submission of the DPIR/DEIR, the Proponent has undertaken archaeological monitoring of the Evans House and has examined recently acquired information, including current utility maps, pertaining to the sensitivity of Avery Place, Mason Street Place, and Fayette Court. Monitoring observations from the Evans House consisted of three (3) trenches (TP1, TP1A and TP1C) which revealed a series of undocumented disturbances. Refer to Comment #4 and #5 for the results of this archaeological investigation.

Comment #4:

Topic: Archaeology

Comment: Describe the utilities that are present in the alley to the rear of the Evans House.

Response:

On August 4th, 7th and 8th, 1989, an archaeologist from the Public Archaeology Laboratory, Inc. monitored excavations that took place within the Commonwealth Center project area. See Figure 59 for location of trenches. Each trench is described below.

Trench TP1: Evans House, southside, 2 meters west of the southeast corner.

This trench revealed a large brick vault and two utility conduits running east/west through the unit. The vaulting pattern and utilities probably continue through the passageway and terminates at Tremont Street; therefore, the likelihood of disturbance west of TP1 is high.

Trench TP1A: Evans House, eastside, 2 meters north of the southeast corner

The northern half of this trench contained a large telephone/telegraph manhole, while the southeast section revealed a small brick vault. A hole appeared in the north wall providing evidence for another vault.

Trench TP1C: Evans House, east side, north corner

This trench was contained within a large vault, transversed, from north to south by a steam pipe; a hole in the south wall provided evidence for another vault. An additional disturbance is inferred from the faced granite stone-work in the east wall of the trench. Unlike the other brick walls of the vault, the granite wall appears to be a remnant of an earlier foundation wall which may have been incorporated as part of the vault.

The three (3) trenches monitored did not contain intact soil horizons. They revealed disturbances to the natural strata caused by the building of previously undocumented brick vaults, as well as utility lines and the construction of the Evans House itself.

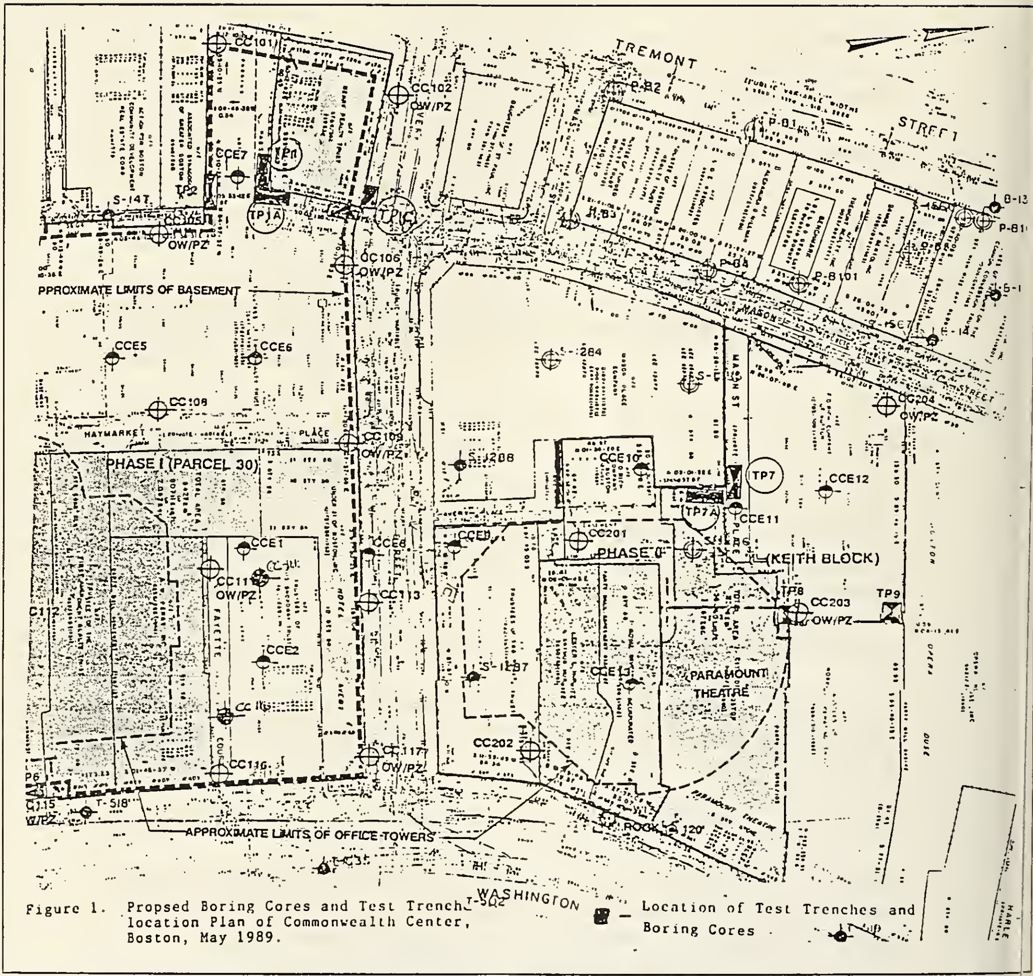


Figure 1. Propsed Boring Cores and Test Trench location Plan of Commonwealth Center, Boston, May 1989.

Location of Test Trenches and Boring Cores

Figure 59. Proposed Boring Cores and Test Trenches Location, May 1989

Comment #5:

Topic: Archaeology

Comment: Reevaluate the likelihood of cultural deposits being present within Fayette Court, Avery Place and Mason Place.

Response:

Excavation and, therefore, monitoring of the western half of the T-shaped termination boundary at Avery Place was not necessary because there are no immediate plans to use this space for either construction or staging. Monitoring the excavation trenches of Avery Place will take place, should any changes to the project design impact this highly sensitive area.

The Mason Street Place alleyway was not monitored due to recent evidence of vault construction. Prior to the original schedule date to monitor the alleyway, an additional plan of Mason Street Place was found. This plan indicates the presence of an underground vault in this location. The vault runs beneath Mason Street Place from the rear of the Paramount Theatre to the corner of Mason Street. Its construction severely limits the potential for archaeological resources to be present in this area.

The alleyway of Fayette Court was also not monitored. Recently acquired boring reports indicated that Fayette Court had been impacted by construction demolition and other previously undocumented disturbances. As shown in Figure 59, boring core CC-111 was placed approximately 40 feet (12 meters) from the northern edge of Fayette Court in the western half of the vacant lot which is adjacent to the alleyway. Figure 59 indicates where the core was placed in relation to its original placement on the project site plan. Boring core CC-111 indicated the presence of structural material infill. The second boring core, CC-116, indicated a uniform brown, sandy fill which probably represents a bedding surface related to building construction.

In summary, due to a series of previously undocumented disturbances outlined above, no additional archaeological testing is recommended in these areas. This discovery of severe disturbances resulted in the alteration of the assessment of the project area's archaeological sensitivity. Avery Place, which at this time will not be impacted directly by building construction, is still considered to be of relatively high sensitivity. Should construction plans be changed to include impact to this area, additional archaeological testing will take place.

APPENDIX A: BRA DOCUMENTS

Metes and Bounds of Project Area

LEGAL DESCRIPTION FOR COMMONWEALTH CENTER

Two certain parcels of land, with the buildings thereon, in Boston, Suffolk County, Massachusetts, comprising various parcels located on Boylston Street, Tremont Street, Mason Street, Mason St. Place, Washington Street, Avery Street, Haymarket Place, Bumstead Court and Head Place, shown on a plan in two sheets entitled "Paramount Center, Compiled Plan of Land in Boston, Ma." dated 16 April, 1986, Revised 10 Sept. 1986 as to Sheet 1, and Revised 19 August, 1986 as to Sheet 2, by William S. Crocker Co., Survey Engineers,(together, the "Plan") bounded and described as follows:

Parcel 1

A certain parcel of land shown on Sheet 1 of the Plan, and bounded and described as follows: Beginning at the junction of the curve at the Northerly side of Boylston Street and the Westerly side of Washington Street, bounded

SOUTHERLY by Boylston Street and by the Southerly side of Bumstead Court, by three lines together measuring one hundred seventy-six and 24/100± (176.24±) feet;

WESTERLY AND NORTHERLY by the Westerly and Southerly lines of Bumstead Court a total distance of about one hundred twenty ± (120±) feet to a point;

WESTERLY, SOUTHERLY, WESTERLY, SOUTHERLY and WESTERLY again by land shown as number 43 Boylston Street by five lines, shown as twenty-six and 87/100 (26.87) feet, thirteen and 27/100 (13.27) feet, nine and 9/100 (9.09) feet, twenty-six and 79/100 (26.79) feet, and sixty-three and 84/100 (63.84) feet;

SOUTHERLY by Boylston Street forty-four and 57/100 (44.57) feet;

WESTERLY by Head Place, as shown on said plan, one hundred one and 13/100 (101.13) feet;

SOUTHERLY again by Head Place, nine and 40/100 (9.40) feet;

WESTERLY again by the middle line of said Head Place forty-one and 50/100 (41.50) feet;

SOUTHERLY again, nine and 40/100 (9.40) feet;

WESTERLY again, one (1.00) foot;

NORTHERLY	four and 90/100 (4.90) feet to the middle of a private way;
WESTERLY	again by the middle of said private way thirty-six and 4/100 (36.04) feet;
NORTHERLY	again, four and 90/100 feet;
WESTERLY	again by middle of said private way by 2 lines, twenty-six and 16/100 (26.16) feet and twenty-three and 82/100 (23.82) feet;
NORTHERLY	by the Northerly end of the private way ten (10) feet;
WESTERLY	by the line of a party wall of the building on land n/f of Associated Synagogues of Greater Boston, Inc. 67/100 (.67) feet;
NORTHERLY	again by several lines by the party wall of said building fifty and 52/100 (50.52) feet, 34/100 (.34) feet, and fifty-three and 78/100 (53.78) feet to Tremont Street;
WESTERLY	by Tremont Street by three lines, twenty-six and 91/100 (26.91) feet to the passageway shown on said plan, thirteen and 78/100 (13.78) feet by the end of said passageway, and sixty and 49/100 (60.49) feet to the Southerly side of Avery Street;
NORTHERLY	by said Avery Street by two lines, together measuring eighty-seven and 78/100 (87.78) feet;
NORTHERLY	again by said Avery Street at the end of the passageway, fifteen and 31/100 (15.31) feet; and
NORTHERLY	again by said Avery Street, by the Northerly end of Haymarket Place and continuing to the Westerly side of Washington Street by three lines together measuring three hundred six and 23/100 (306.23) feet;
EASTERLY	by Washington Street by two lines one hundred seventy-three and 23/100 (173.23) feet, and eighty-nine and 8/100 (89.08) feet; and
SOUTHEASTERLY	by the curved intersection of Washington Street and Boylston Street eighteen and 5/100 (18.05) feet, to the point of beginning.

PARCEL 2

That certain parcel of land shown on Sheet 2 of the Plan bounded and described as follows: Beginning at the southerly line of Mason St. Place at the Easterly side of Mason Street and bounded

WESTERLY by said Mason Street by two lines totalling one hundred five and 7/100 (105.02) feet;

NORTHERLY by land shown as Boston Opera House on said plan above mentioned, one hundred twenty-nine and 50/100 (129.50) feet;

EASTERLY, NORTHERLY, EASTERLY, SOUTHERLY, EASTERLY, NORTHERLY AND EASTERLY, by the middle line of a party wall, nine and 10/100 (9.10) feet, one and 48/100 (1.48) feet, nineteen and 6/100 (19.06) feet, 40/100 (.40) feet, twenty-three (23) feet, two and 78/100 (2.78) feet, and nine and 67/100 (9.67) feet;

NORTHERLY in part by the middle of the party wall of the land shown on said plan as Trustees of Roxbury Operating Trust about one hundred eighteen and 75/100 (118.75) feet;

EASTERLY about one and 17/100 (1.17) feet;

NORTHERLY again about thirty-two and 50/100 (32.50) feet;

EASTERLY by Washington Street by four lines totalling one hundred ninety-nine and 14/100 (199.14) feet, to Avery Street;

SOUTHERLY by Avery Street to the center line of Avery Place by three lines, totalling one hundred forty-four and 82/100 (144.82) feet;

WESTERLY by the center line of Avery Place running north and south, a distance of about sixty-three and 3/100 ± (63.03±) feet;

SOUTHERLY again by the center line of Avery Place running east and west, about forty ± (40±) feet;

WESTERLY by land of Mason Place Company about fifty-six and 27/100 (56.27) feet;

NORTHERLY	by land of Mason Place Company thirty and 40/100 (30.40) feet;
EASTERLY	by line of said land thirty-seven and 57/100 (37.57) feet; and
SOUTHERLY	by the Southerly line of Mason St. Place ninety-one and 26/100 (91.26) feet, to the point of beginning.

BRA Clarification Letters

COMMONWEALTH CENTER

A Joint Venture of F.D. Rich of Boston and A.W. Perry

99 Summer Street
Boston MA 02110

617-737-8300

September 23, 1989

Mr. David Roberts
Boston Redevelopment Authority
One City Hall Square
Boston, MA 02201

Re: Commonwealth Center - Boston
Final PIR/EIR

Dear Dave,

This letter supercedes my letter of September 21 on the same subject. This letter serves to document the results of meetings between the Boston Redevelopment Authority (BRA), the Boston Transportation Department (BTD) and the Commonwealth Center project team to clarify assumptions or modify parts of the Final PIR/EIR scope.

Transportation

A meeting was held on August 24, 1989, at the BRA during which the following clarifications were made:

1. A travel time study will be conducted to determine the most likely route to the site. If the assumptions made by Sasaki prove to be wrong, a new build analysis will be prepared. If not, the analysis shown in the DPIR/DEIR will stand.

2. Two additional intersections will be analyzed in coordination with the Boston Crossing project: Kneeland Street/Surface Artery, and Lincoln Street/Summer Street/Bedford Street.

3. Sasaki will document differences in assumption from Boston Crossing transportation study.

4. As agreed upon, a survey of pedestrians currently around the site will not need to be performed. Sasaki will provide more information regarding desire lines and volumes of pedestrian.

5. Sasaki will address the parking issues related to the project as outlined by the BRA/BTD. Sasaki noted that the project assumes shared use of parking spaces by use, not reserved spaces as stated by the BRA.

A second meeting was held on August 30, 1989, to discuss coordination of the FPIR's for the three projects in the Midtown Cultural District (Commonwealth Center, Boston Crossing and Kingston/Bedford). Andy McClurg of Boston Transportation Department was also present. The following Scope of Clarifications were made:

1. BTD does not require a major reworking of traffic analysis. The FPIR's must only include a description of the major assumptions, in a common format, so that differences in assumptions can be easily determined.

2. The consultants noted that the differences in assumptions did not lead to differences in the relative severity of traffic problems and in locations needing mitigation.

3. The issue of Essex Street widening is viewed as an important issue but this project should be kept separate from the package of intersection improvements listed as mitigation measures in the Transportation Access Plan.

4. The regional links to be analyzed were selected. Six (6) locations on the area expressways were identified. Total traffic volume from the Central Artery plans will be obtained to which site-related traffic will be added. No analysis will be required beyond a comparison of the volumes with and without the project.

Shadow

Based upon conversations with you and Rebecca Roupp of SOM, shadow studies will show the most updated schemes of both the Commonwealth Center and Boston Crossing on October 21st at 10:00 a.m. and 11:00 a.m. To be consistent, we agreed that both projects will prepare the same graphic illustrating the combined shadow covering less than one acre.

If you have any comments, please do not hesitate to call.

Sincerely,

Gordon

Gordon S. Hislop
Senior Development Manager

GSH/eml

cc: Alexander Twining
Howard Kielley
Martha Lampkin
John A. Kessler, Jr., Esq.

COMMONWEALTH CENTER

A Joint Venture of F.D. Rich of Boston and A.W. Perry

99 Summer Street
Boston MA 02110

617-737-8300

October 17, 1989

David Roberts
Boston Redevelopment Authority
One City Hall Plaza, 9th floor
Boston, MA 02201

Re: Commonwealth Center - Boston: Keith Block
BRA Design Comments

Dear Dave,

I conveyed the BRA design staff's concerns regarding the Commonwealth Center Keith Block building to our architect, KPF, on Friday, October 13, 1989. My understanding of the BRA staff's concerns per our phone conversation of Friday is as follows:

1. The tower set back at Washington Street is insufficient.

2. The distance between the towers is less than the original Schematic Design drawings of June 15, 1989.

3. THe buildings look too much alike.

KPF have responded to these concerns in their letter of October 13, 1989 attached. We will be prepared to discuss the responses in greater detail at our project urban design meeting scheduled for 9:00 a.m. Friday, October 20, 1989.

Please call me if you have questions.

Many thanks.

Sincerely,

Gordon

Gordon S. Hislop
Senior Development Manager

GSH/eml

cc: Alexander C. Twining
Howard W. Kielley
Gregory Clement

KOHN PEDERSEN FOX ASSOCIATES PC

Architects & Planning Consultants 111 West 57 Street New York, NY 10019 212 977 6500 Telex: 261-541-COPB-UR

13 October 1989

Mr. Gordon S. Hislop
F.D. RICH COMPANY OF BOSTON
99 Summer Street
Boston, MA 02110

Re: Commonwealth Center
KPF Project No. 599-06

Dear Gordon:

In response to the B.R.A.'s criticisms of the Keith Block Tower, we would like to elaborate on the following at this time:

1. Washington Street Setback: The tightest dimension from the face of the tower to the Washington Street property line on the 6.15.89 Schematic set was 17'-6". Please note that on the preliminary massing model presented to the B.R.A. on Jul 25, 1989, and as currently documented; the setback dimension was altered to 10'-6" when the tower axis changed per B.S.A. request (to increase the dimension between the two towers).

   You should also be aware that the Washington Street "Street wall" height has been reduced from eight stories to six and that the facade is not built out to the property line thus increasing the 10'-6" setback dimension for approximately 50 of the length of the facade. KPF will prepare a diagram to illustrate this condition.

   We have studied alternates for increasing the dimension of the Washington Street Setback.

   Two restrictions prohibit us from shifting the tower. First in shifting the tower west and maintaining a centrally located core within the floor plate, the core would encroach on the Paramount Theatre. As you know the core is tight against the south wall of the Paramount in our current design. Second, on the west side of the site the tower currently goes to the ground and is on the line of the light and air easement behind the Mason Street building. Moving the tower west would, therefore, encroach on this easement.

Based on these two issues it is not feasible to increase the setback of the tower on Washington Street without seriously impacting the governing boundaries.

2. Distance between Towers.

   The dimension between the north and south tower is not less than shown on the schematic design submission, conversely, it is ±6'-0" greater at the worst condition.

   You may also note in the current scheme the tower axis was rotated making the close dimension between towers a worst case condition; the towers will visually read as being further apart. Also, since the top of Keith Block tower steps back, the apparent dimensions between the crowns is far greater still.

3. Cladding Systems

   With regard to the comment that building skins look too similar, we strongly urge you to obtain a consensus of opinion from the B.R.A./B.S.A. Previously, these two bodies have voiced different opinions regarding massing and cladding systems for the two towers.

   However, the simplest way to differentiate the two towers would be to suggest that the stone types for the buildings be different with no change to the fenestration. Obviously, if further studies need to be pursued regarding facade re-design, we would perform the studies, however, it is critical that we have a precise reading on the nature of the issues regarding the cladding systems.

We look forward to reviewing the above with you and the B.R.A. this Friday.

Sincerely,

KOHN PEDERSEN FOX ASSOCIATES, P.C.

Thomas Holzmann

Thomas Holzmann

TH/vb

SCHEMATIC DESIGN RESUBMISSION:

10 NOV., 1989
* REV. 21 NOV., 1989
** REV. 30 NOV., 1989

Parcel 30

No.	Title	Scale
A-003	Architectural Site Plan	1/32" = 1'-0"
A-004	Levels P3-P5	1/16" = 1'-0"
A-005	Level P2	" "
A-006	Level P1	" "
A-006.1	Level P1 Mezzanine	" "
A-007	Ground Level	" "
A-008	Level 2	" "
A-009	Level 3	" "
A-010	Levels 4-5 Office	" "
A-011	Level 6 Office	" "
A-012	Level 7 Office	" "
A-013	Level 8 Office	" "
A-014	Level 9 Office	" "
A-015	Levels 10-12 Office	" "
A-016	Levels 13-15 Office	" "
A-017	Levels 16-31 Office	" "
A-018	Level 32 Roof - Office	" "
A-019	Composite Roof Plan	" "
A-020	Levels 5-6 Hotel	" "
A-021	Levels 7-9 Hotel	" "
A-022	Levels 10-11 Hotel	" "
A-023	Levels 12-13 Mechanical-Hotel	" "
A-024	North Elevation-Office Tower	" "
A-025	East Elevation-Office Tower	" "
A-026	South Elevation-Office Tower	" "
A-027	West Elevation-Office Tower	" "
A-028	Partial East Elevation-Office Base	1/8" = 1'-0"
A-029	Partial South Elevation-Office Base	" "
A-030	Typical Wall Details	3/8" = 1'-0"
A-030A	Partial Tower Wall Elevation	3/4" = 1'-0"
A-035	North and South Elevations-Hotel	1/16" = 1'-0"
A-035.1	South Elevation-Atrium	1/8" = 1'-0"
A-036	East and West Elevations-Hotel	1/16" = 1'-0"
A-037	Partial North Elevations-Hotel	1/8" = 1'-0"
A-043	Office Lobby	" "
A-044	Office Lobby	" "
A-045	Cross Section thru Parcel 30	1/16" = 1'-0"
A-046	Transverse Section thru Parcel 30	" "
A-047	Section thru Hotel	" "

Keith Block		East Elevation	1/16" = 1'-0"
"	*	South Elevation	" "
"	**	North Elevation	" "
"	**	West Elevation	" "
"		Ground Level	" "
"		Levels 3-5	" "
"		Typical Office Level Plans	" "
"		Transverse Section	" "
"		Typical Wall Details	" "
"		Partial Tower Wall Elevation	" "

- Project Description
- Zoning Calculations
- Massing and Open Space Drawing
- Neighborhood Sections
- Major Topographic Features
- Vehicular and Pedestrian Circulation
- Land Use
- Massing Perspective - Proposed Project
- Side View of Tremont Street Looking from the Common
- Perspective Views (4)
- Ground Level Plan with Context
- Joint Tower Elevation from Commons

MA/atm/8570/Z-PARCEL

APPENDIX B:
OTHER STATE AND CITY AGENCIES' DOCUMENTS

Boston Air Pollution Control Commission (BAPCC)

C O M M O N W E A L T H   C E N T E R

A Joint Venture of F.D. Rich of Boston and A.W. Perry

99 Summer Street
Boston MA 02110

617-737-8300

October 12, 1989

Boston Air Pollution Control Commission
City of Boston Environment Department
City Hall, Room 805
Boston, Massachusetts 02210

Attention: Denise K. Breiteneicher, Executive Director

Confirmation of Exemption for Parking
Garage for Commonwealth Center Project

Ladies and Gentlemen:

Commonwealth Center (the "Project") is a major new mixed-use hotel, retail and office project being developed by Commonwealth Center Limited Partnership (the "Developer") to be located on a major portion of the block bounded by Tremont, Boylston, Washington and Avery Streets ("Parcel 30") and a portion of the block across Avery Street bounded generally by Mason Street, Avery Street, Washington Street to and including the Paramount Theatre ("Keith Block"), for which Development Plan approval was voted by the Boston Redevelopment Authority on June 29, 1989.

The Developer is committed to encouraging people to use public transportation to get to and from the Project. We are setting up a transportation management organization (T.M.O.) with the Boston Crossing and the Kingston/Bedford projects to enable us to address transportation issues in a coordinated manner. Together, we will organize programs to promote transit use, ride sharing and staggered working hours for tenants' employees. We will also coordinate our respective transportation access plans and reporting procedures.

On behalf of Commonwealth Center Limited Partnership, I hereby request that the Air Pollution Control Commission (1) issue a Parking Freeze Permit (application attached) for the 341 commercial parking spaces (the "Public Parking Spaces") presently located on the project site under Parking Freeze Permits to F.D. Rich Company of Boston, Inc. and A.W. Perry, Inc. (partners in the Developer), for inclusion in a parking garage for 1,000 cars located below grade on Parcel 30 only, but serving all of Commonwealth Center, and (2) confirm that the remaining 659 spaces in the garage (the "Exempt Spaces") will not be subject to the requirements of the so-called "parking freeze" provided that the garage is (a) owned by Commonwealth Center Limited Partnership or a related entity which is a "commercial entity whose primary business is other than the operation of parking facilities" and (b) "for the exclusive use of its lessees, employees, patrons, customers, clients, patients or guests, and not available for use by the general public. . . ."

On behalf of Commonwealth Center Limited Partnership, I represent to you that Commonwealth Center Limited Partnership or any subsidiary or affiliated entity in which title to the property may be held, (1) is such a "commercial entity. . . whose primary business is other than the operation of parking facilities" and (2) that the parking facility will not be open for operation until such time as we have submitted to you and you have approved detailed procedures by which access to the garage will be controlled such that the Exempt Spaces will not be available for use by the general public, except, and only to the extent that such access may be permitted by the Commission.

For background purposes, we would anticipate that the access to the garage will be controlled by a combination of "car key" access for regular users and an attendant for hotel guests and clients and retail patrons of the Project. Access to and egress from the parking garage will be located on Boylston Street approximately midway between Tremont and Washington Streets with sufficient distance between the street and the access control point of the garage to permit adequate queing space without interfering with traffic flows on Boylston Street. Commonwealth Center Limited Partnership has filed a Draft Project Impact Report with the Boston Redevelopment Authority in accordance with the terms of Article 31 of the Boston Zoning Code which contains a detailed analysis of the traffic impacts of the proposed project, and has received a Preliminary Adequacy Determination which requires additional study of traffic matters in the Final Project Impact Report now being prepared (see copy attached).

It is the hope of Commonwealth Center Limited Partnership, and that of the Boston Redevelopment Authority and numerous theater and arts groups which have collaborated in the formulation of the new Midtown Cultural District, that provision will be able to be made within the constraints of the "parking freeze" to make parking spaces such as those in the garage of the Project available to the users of theater and arts facilities in the Cultural District during off-peak hours. Much of this use may be accomplished through use of the Public Spaces transferred from the existing lots at grade to the new garage of the Project, but greater use of this kind could be accomplished by use of the Exempt Spaces during off-peak hours in such a manner that such use would not contribute to either traffic congeston or air quality control issues. However, any use of Exempt Spaces for this purpose will be the subject of a separate application, and we would respectfully request that this application for the issuance of a Parking Freeze Permit and the confirmation of an exemption pursuant to paragraph C.4. of the Procedures and Criteria for Issuance of Parking Freeze Permits not be delayed in any manner because of this willingness to cooperate in making such spaces available for theatre and arts uses as a part of a more general plan for the Midtown Cultural District.

Please do not hesitate to call me if I can answer any questions or be of any other assistance in connection with the processing of this application and request for confirmation of an exemption.

Sincerely yours,

Gordon

Gordon S. Hislop
Senior Development Manager

GSH/eml

cc: Alexander C. Twining
Kristen J. McCormack
Theodore S. Chandler, Esq.
Pamela Wessling
John A. Kessler, Esq.

APPENDIX C

CITY OF BOSTON AIR POLLUTION CONTROL COMMISSION
APPLICATION FOR PARKING FREEZE PERMITS

City of Boston
The Environment
Department.

Boston City Hall/Room 805
Boston, Massachusetts 02201
617-725-4416 or 725-3850

1. Name and address of Facility.

Commowealth Center : Boston
One Boylston Street, Boston, MA 02025

2. Name and address of Land Owner.

Commonwealth Center Inc.
99 Summer Street, Boston, MA 02110

3. Name and address of Lessee. (If different from owner)

____

4. Parcel No. of Land. (Assessing Dept.)

See survey drawings # 73.01M and 73.02M attached.

5. Type of Facility: Lot Office, Retail, Hotel, Day Care

Garage Office, Retail, Hotel, Day Care

6.

Type of Request	Number of Spaces Proposed New	Existing
New Facility		
Addition to Existing Facility	659	341

7.

Type of Spaces	Number
Commercial	341
Hotel ~~Residential~~	59
Office Tenants ~~Employees~~	600
Other (describe in detail on separate sheet)	

8.

	Month	Day
Estimated Commencement	3	1
Estimated Completion	9	1

Please include below a general description of the need for the proposed facil and the type of development and patrons it will serve.

The parking facility is required for tenants, guests, and visitors to the Commonwealth Center mixed use development consisting of office, retail, hotel and day care uses.

The development is to be built in two phases.

The parking is located in the subgrade area under the first phase in One Boylston Street building.

Please indicate the proposed rate structure, per day and per hour, along with days of the week these rates pertain, to, and the type of parking (i.e., va self-parking).

RATES: Market rates at years end 1992.

HOURS: 24 hours / 7 days per week

TYPE: Self park and Valet park

Please attach a site plan or floor plan of the proposed lot or garage, showing location of the facility, the layout of spaces, entry and and exit points, and total square footage of the parking area.

See KPF's drawings # A - 004, A - 005, A - 006 dated May 15, 1989 attached.

Please include the route and distance that the vehicles must travel from ent and exit points to the nearest major highways in the area.

See diagram attached

Please describe the proposed landscaping and the extent to which the fac conforms with land use patterns in the surrounding area.

The facility is located below grade so that landscaping is not a requirement.

The facility is zoned for parking and is consistant with the commercial land use patterns in the surrounding area.

The parking control point will be set back from Boylston Street to eliminate vehicle queuing.

Federal Aviation Association (FAA)

COMMONWEALTH CENTER

A Joint Venture of FD Rich of Boston and AW Perry

99 Summer Street
Boston MA 02110

617 737 8300

December 29, 1989

Mr. John Silva
Environmental Program Manager
Federal Aviation Administration
12 New England Executive Park
Burlington, MA 01803

Re: Commonwealth Center - Boston
Notice of Proposed Construction

Dear Mr. Silva:

In compliance with your letter dated June 16, 1989 regarding proposed heights for the Commonwealth Center project, enclosed you will find a completed Notice of Proposed Construction (FAA Form 7460-1).

If you have any questions regarding the enclosed application, please do not hesitate to contact me.

Sincerely,

Gordon S. Hislop
Senior Development Manager

GSH/eml

Enclosures

cc: Thomas L. Rich
Alexander C. Twining
Howard W. Kielley
Mecky Adnani ✓

U.S. Department
of Transportation

**Federal Aviation
Administration**

New England Region

**12 New England Executive Par
Burlington, Massachusetts 01**

[illegible]: Cc
[illegible] RECEIVED: 6·22·89
CONFIRMED: HWK

ACTION:

TO FILE #:

JUN 20 1989

JUN 16 1989

Ms. Mecky Adnani
Aasasaki Associates, Inc.
64 Pleasant Street
Watertown, Massachusetts 02172

Dear Ms. Adnani:

We have reviewed the Draft Project and Environmental Impact Report (EOEA 7113) for Commonwealth Center in Boston.

Federal Aviation Administration's (FAA) concern is with the proposed height of such development projects. In accordance with Federal Aviation Regulation Part 77, project proponents are required to file a Notice of Proposed Construction (FAA Form 7460-1) with FAA for each structure over 200 feet above ground level. This enables the FAA to evaluate the effect of the development on navigable airspace.

Please file the appropriate enclosed forms when the proposed heights are certain.

Sincerely,

John Silva
Environmental Program Manager

Enclosure

cc: John DeVillars, Secretary, Executive Office of Environmental Affairs

/OT REMOVE CARBONS

Form Approved OMB No 2120-000

partment of Transportation
al Aviation Administration

NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

Aeronautical Study Number

ature of Proposal

ype New Construction Alteration	B. Class ☒ Permanent ☐ Temporary (Duration ______ months)	C. Work Schedule Dates Beginning Apr. 1990 End Sept 1996

Name and address of individual, company, corporation, etc. proposing the construction or alteration. *(Number, Street, City, State and Zip Code)*

17) 737-8300
ea code Telephone Number

Commonwealth Center Limited Partnership
c/o F.D. Rich Company of Boston
99 Summer Street, Suite 1800
Boston, MA 02110-1200

ame, address and telephone number of proponent's representative if different then 3 above.

See Attachment

2. Complete Description of Structure

A Include effective radiated power and assigned frequency of all existing, proposed or modified AM, FM, or TV broadcast stations utilizing this structure

B Include size and configuration of power transmission lines and their supporting towers in the vicinity of FAA facilities and public airports

C Include information showing site orientation, dimensions, and construction materials of the proposed structure.

A. No AM, FM or TV broadcast stations are planned for the Project.

B. No power transmission lines are part of the proposed Project.

C. See plans provided under separate cover & attached de

(If more space is required, continue on a separate sheet.)

ocation of Structure

Coordinates nearest second)	B. Nearest City or Town, and State Boston, MA	C. Name of nearest airport, heliport, flightpark or seaplane base Logan Int'l
2° 21' 10" ude	(1) Distance to 4B Within Boston 0 Miles	(1) Distance from structure to nearest point of nearest runway approx. 2½ mi.
1° 03' 51" gitude	(2) Direction to 4B Within Boston	(2) Direction from structure to airport Northeast

5. Height and Elevation *(Complete to the nearest fo*

A Elevation of site above mean sea level Tower structure	32'
B. Height of Structure including all appurtenances and lighting *(if any)* above ground, or water if so situated	495'
C Overall height above mean sea level *(A + B)*	527'

escription of location of site with respect to highways, streets, airports, prominent terrain features, existing structures, etc. Attach a U.S. Geological Survey quadrangle map or equivalent showing the relationship of construction site to nearest airport(s) *(If more space is required, continue on a separate sheet of paper and attach to this notice.)*

See Attachment

ice is required by Part 77 of the Federal Aviation Regulations (14 C.F.R. Part 77) pursuant to Section 1101 of the Federal Aviation Act of 1958, as amended (49 U.S.C. 1101). sons who knowingly and willingly violate the Notice requirements of Part 77 are subject to a fine (criminal penalty) of not more than $500 for the first offense and not more n $2,000 for subsequent offenses, pursuant to Section 902(a) of the Federal Aviation Act of 1958, as amended (49 U.S.C. 1472(a))

EREBY CERTIFY that all of the above statements made by me are true, complete, and correct to the best of my owledge. In addition, I agree to obstruction mark and/or light the structure in accordance with established marking & hting standards if necessary.

e. 12/22/89	Typed Name/Title of Person Filing Notice Development Manager	Signature

R FAA USE ONLY *FAA will either return this form or issue a separate acknowledgeme*

he Proposal:

☐ Does not require a notice to FAA.

☐ Is not identified as an obstruction under any standard of FAR, Part 77, Subpart C, and would not be a hazard to air navigation.

☐ Is identified as an obstruction under the standards of FAR, Part 77, Subpart C, but would not be a hazard to air navigation.

☐ Should be obstruction ☐ marked, ☐ lighted per FAA Advisory Circular 70/7460-1, Chapter(s) ______

☐ Obstruction marking and lighting are not necessary.

Remarks:

Supplemental Notice of Construction FAA Form 7460-2 is required any time the project is abandoned, or

☐ At least 48 hours before the start of construction.

☐ Within five days after the construction reaches its greatest height.

This determination expires on ______ unles

(a) extended, revised or terminated by the issuing office:

(b) the construction is subject to the licensing authority of the Federal Communications Commission and application for a construction permit is made to the FCC on or before the above expiration date. In such c the determination expires on the date prescribed by the FCC for completion of construction, or on the d the FCC denies the application.

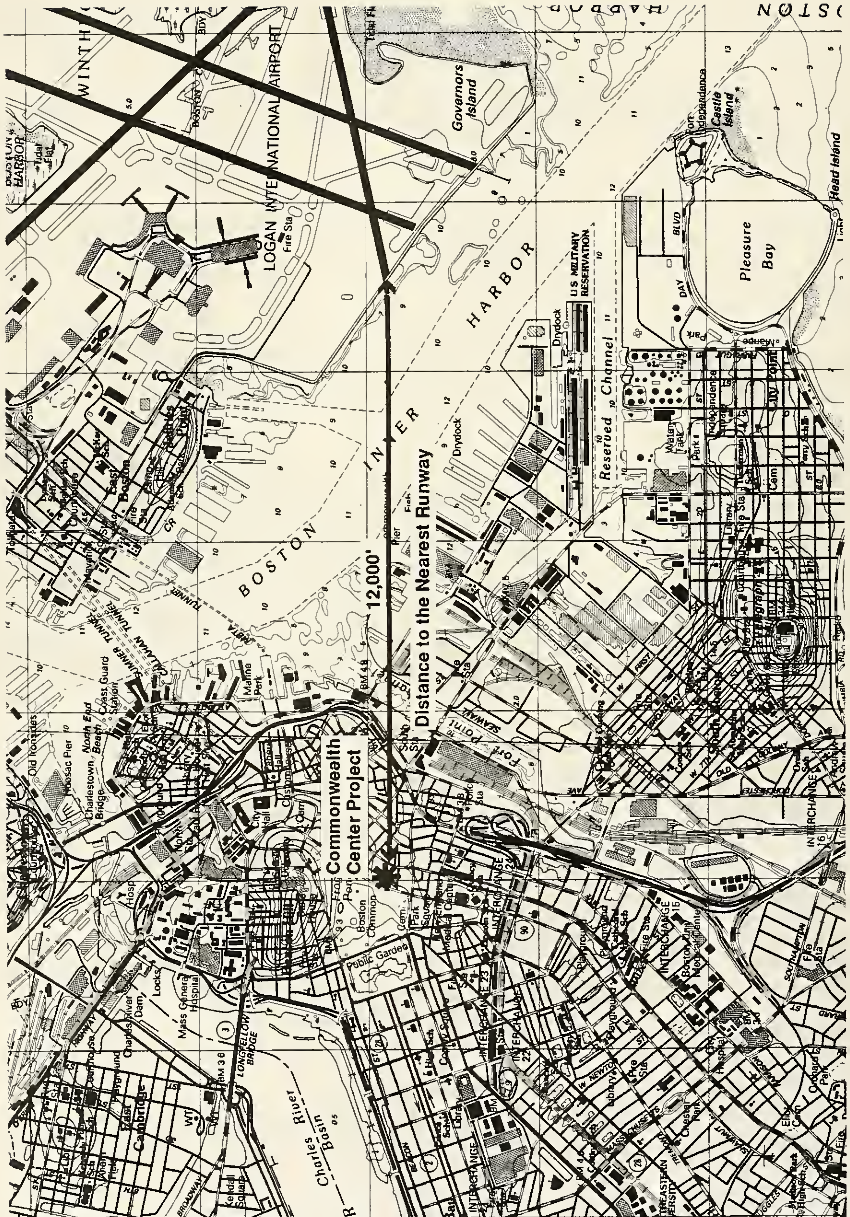
NOTE: Request for extension of the effective period of this determination must be postmarked or delivered to issuing office at least 15 days prior to the expiration date.

If the structure is subject to the licensing authority of the FCC, a copy of this determination will be sent to Agency.

ued in	Signature	Date

A Form 7460-1 (8-85)

DO NOT REMOVE CARB


Commonwealth Center Project
Distance to the Nearest Runway
12,000'
LOGAN INTERNATIONAL AIRPORT
BOSTON INNER HARBOR
Governors Island
Castle Island
Pleasure Bay
Head Island
Reserved Channel
US MILITARY RESERVATION
East Boston
Boston Common
Public Garden
Charles River Basin
LONGFELLOW BRIDGE
East Cambridge
Back Bay
NORTHEASTERN UNIVERSITY
WINTHROP
BOSTON HARBOR

COMMONWEALTH CENTER PROJECT

The proposed Commonwealth Center Project is located on portions of a two block site in Boston's Midtown Cultural District, and consists of three building of varying height, form, fenestration and materials.

The Proposed Project comprises a 3.3 acre site located on two blocks between lower Washington Street and the Boston Common (see figure 4). The first site, known as Parcel 30, comprises approximately two-thirds of the block bounded by Tremont, Boylston, Avery and Washington Streets. The second site known as the Keith Block, is located directly to the north of Parcel 30 and is and irregular corner site bounded by Washington, Avery and Mason Streets.

The Proposed Project entails construction of approximately 1.9 million gross square of new development, to be located in three buildings on the site. The largest building, to be located on the Parcel 30 block near the corner of Bolston and Washington Streets, will be 32 stories tall and contain approximately 830,000 gross square feet of office space. The office portion of the building will sit on top of a retail arcade containing approximately 91,000 gross square feet of retail and restaurant space. Located adjacent to the office building on the Parcel 30 block is a 13-story hotel of approximately 419 rooms. A below-grade garage provides parking for 1000 vehicles serving hotel guests, office workers and night time theater-goers.

A third building. located on the Keith Block at the corner of Avery and Wahington Streets, will be 32 stories tall and contain approximately 530,000 gross square feet of office space and 8,000 gross square feet of retail space. Adjacent to this building is the landmark Paramount Theater which will be restored and converted into two performing arts theaters.

4. LOCATION OF STRUCTURE

D. The Project site is located in Boston's newly zoned Midtown Cultural District, bordered by the Financial District, the Downtown Crossing Retail District, Chinatown and the Park Square District. The site is adjacent to the southeastern corner of the Boston Common on portions of the two blocks known as Parcel 30 and the Keith Block. Parcel 30 is bounded by Washington, Tremont and Boylston and Avery Streets. The Keith Block is bounded by Avery, Mason, Washington and West Streets. The site is approximately five blocks from Boston's Central Artery, I-93, and six blocks from South Station. The site is approximately 2.5 miles from Logan International Airport.

WILLIAM S. CROCKER CO.
285 SUMMER STREET
BOSTON, MASSACHUSETTS 02210
TEL. (617) 430-4384
FAX (617) 951-2017

UNTHER GREULICH, PE, PLS
ETER J. GREULICH, PLS

H. B. ULLIAN, PE, RLS
1932 – 1988

December 13, 1989

. D. Rich Co. of Boston
9 Summer Street
uite 1800
oston, MA 02210

TTENTION: Mr. Alex Twining

EFERENCE: Commonwealth Center F.A.A. Application (Our Job No. W-3084.20)

ear Alex:

In accordance with your request of December 13, 1989, we have calculated the latitude and longitude description of the approximate center of the "Parcel 30" block (the southerly portion of the Commonwealth Center Project).

The definition of that approximate location is:

42° - 21' - 10" North Latitude
71° - 03' - 51" West Longitude

Should you need any further assistance in this matter, please do not hesitate to call.

Very truly yours,
WILLIAM S. CROCKER CO.

Gunther Greulich, PE, PLS

GG/nc
Enclosures

U.S. Department
of Transportation

**Federal Aviation
Administration**

New England Region

12 New England Executive Park
Burlington, Massachusetts 018

CONTROL No.: CC
DATE RECEIVED: 6-22-89
CONFIRMED: HWK

ACTION:

TO FILE #:

JUN 20 1989

JUN 16 1989

Ms. Mecky Adnani
Aasasaki Associates, Inc.
64 Pleasant Street
Watertown, Massachusetts 02172

Dear Ms. Adnani:

We have reviewed the Draft Project and Environmental Impact Report (EOEA 7113) for Commonwealth Center in Boston.

Federal Aviation Administration's (FAA) concern is with the proposed height of such development projects. In accordance with Federal Aviation Regulation Part 77, project proponents are required to file a Notice of Proposed Construction (FAA Form 7460-1) with FAA for each structure over 200 feet above ground level. This enables the FAA to evaluate the effect of the development on navigable airspace.

Please file the appropriate enclosed forms when the proposed heights are certain.

Sincerely,

John Silva
Environmental Program Manager

Enclosure

cc: John DeVillars, Secretary, Executive Office of Environmental Affairs

Paramount Theater
Certificate of Design Approval

Boston
Landmarks
Commission

**City of Boston
The Environment
Department**

Boston City Hall/Room 805
Boston, Massachusetts 02201
617/725-3850

August 1, 1989

BOSTON LANDMARK: PARAMOUNT THEATER
1930-32 A.H. Bowditch (arch't)

Mr. Alex Twining
F.D. Rich Company
171 Milk Street
Boston, Massachusetts 02109

RE: Application #23.88-1
549 - 563 WASHINGTON STREET - PARAMOUNT THEATER

Dear Mr. Twining,

At a meeting held in Boston City Hall on July 25, 1989, the Boston Landmarks Commission, in accordance with Chapter 772 of the Acts of 1975, as amended, reviewed your application for an amendment to a Conceptual Approval (2/15/89) for the Keith Block tower above the theater building in the Commonwealth Center project.

In its review of the modified design, the commission noted that the impact on the Paramount Theater remained minimal. It also noted the extensive redesign reduced shadow impact on the nearby Boston Common (another designated landmark). It endorsed attempts to provide each elevation with an architectural identity, a feature not seen in the original design.

The commission reiterated that this approval was for an amendment only to a previous conceptual approval. As design development continues, details shall be submitted to the commission for review. Please contact this office to arrange further review of the design review committee and full commission.

Thank you for cooperation with the commission.

Respectfully,

Judith B. McDonough (CH)

Judith B. McDonough
Executive Director, Boston Landmarks Commission
The Environment Department

cc: Alan Schwartz

RECORD OF COMMISSION VOTE: Application #23.88-1
MOTION BY Bertman SECOND BY Ryan
AFFIRMATIVE: Schwartz, Harrell, Quatrale,
Moss, Gilmore, Bertman, Alexander
NEGATIVE: (None)

APPENDIX C: DISTRIBUTION LIST

COMMONWEALTH CENTER
FINAL PIR/EIR DISTRIBUTION

City Agencies

Stephen Coyle, Director
Boston Redevelopment Authority
One City Hall Square
9th Floor
Boston, MA 02201

William Whitney, Director
Urban Design and Development
Boston Redevelopment Authority
One City Hall Square
9th Floor
Boston, MA 02201

Richard Mertens
Director of Special Project Planning
Boston Redevelopment Authority
One City Hall Square
9th Floor
Boston, MA 02201

David Roberts
Boston Redevelopment Authority
One City Hall Square
9th Floor
Boston, MA 02108

Kristen J. McCormack
Director
Midtown Cultural District Development
Boston Redevelopment Authority
One City Hall Square
Boston, MA 02201

David Conlon, Acting Commissioner
Boston Water and Sewer Commission
10 Post Office Square
Boston, MA 02109

The Honorable Salvatore F. DiMasi
Massachusetts House of Representatives
State House, Room 138
Boston, MA 02133

Federal Agencies

Ed Reiner
United States Environmental Protection Agency
JFK Building
Boston, MA 02203

Federal Aviation Administration
New England Region
12 New England Executive Park
Burlington, MA 01803

Interested Parties

Jerome F. Murphy, Treasurer
M. Steinert & Sons
162 Boylston Street
Boston, MA 02116

Antonia M. Pollack, Executive Director
Boston Preservation Alliance
Old City Hall
45 School Street
Boston, MA 02108

Henry Lee
President
Friends of the Public Garden and Common
90 Mt. Vernon Street
Boston, MA 02108

Connie Brown
Executive Director
Boston Theater District Association
216 Tremont Street
Boston, MA 02116

George Joe
Executive Director
Chinatown/South Cove Neighborhood Council
31 Beach Street, Suite 203
Boston, MA 02111

Bethany B. Kendall
President
Downtown Crossing Association
59 Temple Place, Suite 1014
Boston, MA 02111

James L. Sullivan
President
Greater Boston Chamber of Commerce
600 Atlantic Avenue, 15th Floor
Boston, MA 02210-2200

Mark Primack
Executive Director
The Boston Greespace Alliance, Inc.
44 Bromfield Street, No. 207
Bosotn, MA 02108

Chinese Consolidated Benevolent Association of New England
90 Tyler Street
Boston, MA 02111

Thomas Hilditch
Property MAnager
First Realty Management
151 Tremont Street
Boston, MA 02111

Rafaela M. Rodriguez
Tenant Association
80 Mason Place, #504
Boston, MA 02111

Richard Dimino, Commissioner
Department of Transportation
City of Boston
One City Hall Square
Boston, MA 02201

Lorraine Downey, Director
Environmental Department
City of Boston
Room 805
One City Hall Square
Boston, MA 02201

Steve Pendery
City Archaeologist
Environmental Department
City of Boston
Room 805
One City Hall Square
Boston, MA 02201

Judith McDonough, Executive Director
Boston Landmarks Commission
Environmental Department
One City Hall Square
Boston, MA 02201

Brian Glascock, Executive Secretary
Boston Conservation Commission
One City Hall Square
8th Floor
Boston, MA 02201

Denise Breiteneicher, Executive Director
Boston Air and Noise Pollution Control Commission
One City hall Square
Room 805
Boston, MA 02201

Theodore C. Landsmark
Director
Mayor's Office of Jobs and Community Services
43 Hawkins Street
Boston, MA 02114

Bruce P. Rossley
Commissioner
Office of the Arts and Humanities
Boston City Hall, Room 803
Boston, MA 02201

The Honorable James M. Kelly
Boston City Council
Boston City Hall
One City Square
Boston, MA 02201

Lawrence A. Dwyer
Commissioner
Department of Parks and Recreation
1010 Massachusetts Avenue
Roxbury, MA 021821

Edward Burke
Mayor's Office of Neighborhod Services
Boston City Hall, Room 709A
One City Hall Plaza
Boston, MA 02201

State Agencies

John DeVillars, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Paul Levy, Executive Director
Massachusetts Water Resources Authority
Charlestown Navy Yard
100 First Avenue
Boston, MA 02129

Thomas C. McMahon
Department of Environmental Quality Engineering
Division of Water Pollution Control
One Winter Street
Boston, MA 02108

Department of Environmental Quality Engineering
One Winter Street
Boston, MA 02108

Department of Environmental Quality Engineering
Division of Air Quality Control
One Winter Street
Boston, MA 02108

Department of Environmental Quality Engineering
Division of Water Pollution Control
Metropolitan Boston/Northeast Regional Office
5 Commonwealth Avenue
Woburn, MA 01801

Department of Environmental Quality Engineering
Division of Air Quality Control
Metropolitan Boston/Northeast Regional Office
5 Commonwealth Avenue
Woburn, MA 01801

Executive Office of Communities and Development
State Clearinghouse
100 Cambridge Street - 9th Floor
Boston, MA 02202

Frederick P. Salvucci, Secretary
Executive Office of Transportation and Construction
State Transportation Building
10 Park Plaza
Boston, MA 02116

Jane Garvey, Commissioner
Massachusetts Department of Public Works
State Transportation Building
10 Park Plaza
Boston, MA 02116

District 8, Section Chief
Massachusetts Department of Public Works
400 D Street
Boston, MA 02210

William V. Twomey, Director

Central Artery/Third Harbor Tunnel Project
One South Station
Boston, MA 02110

Valarie A. Talmage, Executive Director
Massachusetts Historical Commission
80 Boylston Street - Room 310
Boston, MA 02116

Dr. Alden Raine, Director
Governor's Office of Economic Development
State House - Room 109
Boston, MA 02133

Arnold R. Stymest
Director of Aeronautics
Massachusetts Aeronautics Commission
State Transportation Building
10 Park Plaza
Boston, MA 02166

David C. Soule, Executive Director
Metropolitan Area Planning Council
60 Temple Place
Boston, MA 02111

Thomas Glynn, General Manager
Massachusetts Bay Transportation Authority
Ten Park Plaza
Boston, MA 02116

Jane Chmielinski, Environmental Coordinator
Massachusetts Bay Transportation Authority
10 Park Plaza
Boston, MA 02116

Ilyas Bhatti, Commissioner
Metropolitan District Commission
20 Somerset Street
Boston, MA 02108

APPENDIX D: TECHNICAL DATA

Transportation

```
SASAKI ASSOCIATES INC   USING CINCH (VER 2.1) BY SASAKI ASSOCIATES, INC.                10-19-1989  11:29:52
PROJECT NAME: COMMONWEALTH CENTER FEIR  PROJECT NUMBER: 8570.03  BY: SHR

1985 HCM - CHAPTER 9: SIGNALIZED
KNEELAND STREET/SURFACE ARTERY
AM PEAK HOUR  EXISTING CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KNSAAMEX   GEOMETRICS=KNEESURF   SIGNAL=KNEESURF
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT      LT   TH   RT    WALK
EB  334  161  165   660    1  1  1    12.0 12.0 12.0    50
WB   47  492   22   561    0  2  1     0.0 12.0 12.0    50
NB    0    0    0     0    0  0  0     0.0  0.0  0.0     0
SB  155  447  172   774    0  4  0     0.0 12.0  0.0    50

TOTAL VOLUME =  1995

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y     0    0   .900    0   Y    19.5    3
WB  0.0%  2.0%   Y     0    0   .900    0   Y    19.5    3
NB  0.0%  0.0%         0    0   .000    0        19.5    0
SB  0.0%  2.0%   N     0    0   .900    0   N    19.5    4

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                                         12.1   5    A
 2  *  *  *     *  *  *                             18.5   5    A
 3                    *                 *  *  *     14.4   5    A

CYCLE= 60.0  LOST=15.0  SUM V/S CRIT= 0.43 TOTAL V/C= 0.57

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF   Delay LOS Avg Q  95%

EB  L     1800 0.57 * 0.59  60.0   5.70  652    0.68 1.00    6.38  B   4.9   16
EB  T     1800 0.17   0.59  60.0   4.20 1057    0.00 0.85    3.57  A   1.2    4
EB  R     1800 0.20   0.59  60.0   4.30  898    0.00 0.85    3.65  A   1.2    5
WB  L-T   1800 0.57 * 0.31  60.0  13.23 1101    0.42 0.85   11.60  B   6.9   22
WB  R     1800 0.03   0.63  60.0   3.13  958    0.00 0.85    2.66  A   0.1    1
SB  L-T-R 1800 0.57 * 0.24  60.0  15.25 1656    0.28 0.62    9.63  B  10.9   34

DIR Delay LOS
EB   5.01  B
WB  11.26  B
SB   9.63  B
INTERSECTION DELAY =  8.64 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
KNEELAND STREET/SURFACE ARTERY
PM PEAK HOUR  EXISTING CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KNSAPMEX   GEOMETRICS=KNEESURF   SIGNAL=KNEESURF
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES      # OF LANES      LANE WIDTH     CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT      LT   TH   RT     WALK
EB  400  172  446  1018    1  1  1    12.0 12.0 12.0    50
WB   90  320   14   424    0  2  1     0.0 12.0 12.0    50
NB    0    0    0     0    0  0  0     0.0  0.0  0.0     0
SB  121 1434  266  1821    0  4  0     0.0 12.0  0.0    50

TOTAL VOLUME =  3263

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y     0    0   .900    0  Y    19.5    3
WB  0.0%  2.0%   Y     0    0   .900    0  Y    19.5    3
NB  0.0%  0.0%         0    0   .000    0       19.5    0
SB  0.0%  2.0%   N     0    0   .900    0  N    19.5    4

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                                         11.1   5    A
 2  *  *  *     *  *  *                              9.2   5    A
 3                    *                 *  *  *     24.7   5    A

CYCLE= 60.0  LOST=10.0  SUM V/S CRIT= 0.65 TOTAL V/C= 0.78

LEVEL OF SERVICE WORKSHEET
DIR L GRP   SAT  v/c CM g/C     C     d1     c      d2   PF    Delay LOS Avg Q  95%

EB  L       1800 0.90    0.42  60.0  12.30   493   15.67 1.00   27.97  D    7.5   23
EB  T       1800 0.25    0.42  60.0   8.54   752    0.00 0.85    7.26  B    1.8    6
EB  R       1800 0.78 *  0.42  60.0  11.33   639    5.00 0.85   13.88  B    4.9   16
WB  L-T     1800 0.88    0.15  60.0  18.91   544   12.29 0.85   26.52  D    7.6   24
WB  R       1800 0.02    0.65  60.0   2.86   981    0.00 0.85    2.43  A    0.1    1
SB  L-T-R   1800 0.78 *  0.41  60.0  11.60  2870    1.17 0.70    8.95  B   19.8   60

DIR Delay LOS
EB  18.30  C
WB  25.76  D
SB   8.95  B
INTERSECTION DELAY = 13.85 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
SUMMER ST/LINCOLN ST/BEDFORD ST
AM PEAK HOUR  EXISTING CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=SULIAMEX   GEOMETRICS=SUMMLINC   SIGNAL=SUMMLINC
LOCATED IN CBD:N
VOLUME & GEOMETRICS
              VOLUMES         # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT  TOTAL   LT  TH  RT      LT    TH    RT     WALK
EB    0    90     3     93    0   1   1     0.0  12.0  12.0     36
WB  165   255     0    420    1   1   0    12.0  12.0   0.0     33
NB  268   327   101    696    1   1   1    12.0  12.0  12.0     27
SB    0     0     0      0    0   0   0     0.0   0.0   0.0      0

TOTAL VOLUME =  1209

TRAFFIC & ROADWAY CONDITIONS
                    ADJ PARK               PEDESTRIANS          ARR
DIR GRADE  %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N      0     0   .910  450    N    11.0    3
WB  0.0%  2.0%    N      0     0   .910 1000    N    11.0    3
NB  0.0%  2.0%    N      0     0   .910  850    N     8.8    3
SB  0.0%  0.0%           0     0   .000    0          8.8    0

PHASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
   l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1          *           *  *  *  *                  24.9   5    A
 2             *  *                             *   13.2   5    A
 3    *  *        *                 *           *    6.9   5    A

CYCLE= 60.0  LOST=15.0  SUM V/S CRIT= 0.36 TOTAL V/C= 0.49

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT   v/c CM g/C     C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  T     1800 0.49 * 0.11  60.0  18.94  204    0.00 0.85   16.10  C   1.5     5
EB  R     1800 0.04   0.11  60.0  17.96   91    0.00 0.85   15.27  C   0.0     1
WB  L     1800 0.49 * 0.22  60.0  15.51  373    0.00 1.00   15.51  C   2.4     8
WB  T     1800 0.38   0.42  60.0   9.16  745    0.00 0.85    7.79  B   2.7     9
NB  L     1800 0.42   0.42  60.0   9.44  703    0.00 1.00    9.44  B   2.9    10
NB  T     1800 0.49 * 0.42  60.0   9.77  740    0.00 0.85    8.30  B   3.5    11
NB  R     1800 0.40   0.42  60.0   9.36  277    0.00 0.85    7.95  B   1.1     4

DIR Delay LOS
EB  16.07  C
WB  10.82  B
NB   8.69  B
INTERSECTION DELAY = 10.00 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
SUMMER ST/LINCOLN ST/BEDFORD ST
PM PEAK HOUR  EXISTING CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=SULIPMEX   GEOMETRICS=SUMMLINC   SIGNAL=SUMMLINC
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT       LT   TH   RT     WALK
EB    0  150    5   155    0  1  1      0.0 12.0 12.0     36
WB  195  185    0   380    1  1  0     12.0 12.0  0.0     33
NB   54  224  132   410    1  1  1     12.0 12.0 12.0     27
SB    0    0    0     0    0  0  0      0.0  0.0  0.0      0

TOTAL VOLUME =   945

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK               PEDESTRIANS          ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0     0   .920  450   N     11.0    3
WB  0.0%  2.0%   N     0     0   .920 1000   N     11.0    3
NB  0.0%  2.0%   N     0     0   .920  850   N      8.8    3
SB  0.0%  0.0%         0     0   .000    0          8.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 22.4   5    A
 2              *  *                             *  13.0   5    A
 3     *  *        *                 *           *   9.5   5    A

CYCLE= 60.0  LOST=15.0  SUM V/S CRIT= 0.43 TOTAL V/C= 0.58

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  T     1800 0.58 * 0.16  60.0  17.76  283    1.73 0.85   16.57  C    2.3    8
EB  R     1800 0.04   0.16  60.0  16.24  126    0.00 0.85   13.81  B    0.1    1
WB  L     1800 0.58 * 0.22  60.0  15.97  368    1.34 1.00   17.30  C    2.8    9
WB  T     1800 0.25   0.46  60.0   7.51  819    0.00 0.85    6.38  B    1.8    6
NB  L     1800 0.09   0.37  60.0   9.26  633    0.00 1.00    9.26  B    0.6    3
NB  T     1800 0.37   0.37  60.0  10.35  666    0.00 0.85    8.80  B    2.5    9
NB  R     1800 0.58 * 0.37  60.0  11.39  249    1.97 0.85   11.36  B    1.5    5

DIR Delay LOS
EB  16.48  C
WB  11.99  B
NB   9.68  B
INTERSECTION DELAY = 11.72 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/WASHINGTON STREET
AM PEAK HOUR  EXISTING CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=ESWAEXAM   GEOMETRICS=ESSXWASH   SIGNAL=ESSXWASH
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR LT    TH   RT  TOTAL  LT TH RT      LT   TH   RT    WALK
EB  115  700    0   815    0  3  0     0.0 12.0  0.0    35
WB    0    0    0     0    0  0  0     0.0  0.0  0.0    35
NB    0  215   127  342    0  2  1     0.0 12.0 12.0    50
SB    0    0    0     0    0  0  0     0.0  0.0  0.0    50

TOTAL VOLUME =  1157

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%   N     0    0   .900  240   Y    10.8    3
WB  0.0%  0.0%         0    0   .000    0   Y    10.8    0
NB  0.0%  3.0%   N     0    0   .900  300   Y    14.5    3
SB  0.0%  0.0%         0    0   .000    0   Y    14.5    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                             *           *  24.2   5    A
 2           *           *     *  *                 11.8   5    A
 3           *           *           *           *   0.0  14    A

CYCLE= 60.0  LOST=24.0  SUM V/S CRIT= 0.28 TOTAL V/C= 0.47

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF   Delay LOS Avg Q  95%

EB  L-T   1800 0.47 * 0.40  60.0  10.05 2098    0.00 0.85    8.55 B   9.0   28
NB  T     1800 0.36   0.20  60.0  15.81  699    0.00 0.85   13.44 B   3.2   11
NB  R     1800 0.47 * 0.20  60.0  16.21  297    0.00 0.85   13.78 B   1.9    7

DIR Delay LOS
EB   8.55  B
NB  13.56  B
INTERSECTION DELAY =  9.96 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/WASHINGTON STREET
PM PEAK HOUR  EXISTING CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=ESWAEXPM   GEOMETRICS=ESSXWASH   SIGNAL=ESSXWASH
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES          # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT   TOTAL  LT  TH  RT      LT    TH    RT    WALK
EB  103   686     0    789    0   3   0     0.0  12.0   0.0    35
WB    0     0     0      0    0   0   0     0.0   0.0   0.0    35
NB    0   314   333    647    0   2   1     0.0  12.0  12.0    50
SB    0     0     0      0    0   0   0     0.0   0.0   0.0    50

TOTAL VOLUME =  1436

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME  TYPE
EB  0.0%  3.0%   N      0     0   .900  650   Y     10.8     3
WB  0.0%  0.0%          0     0   .000    0   Y     10.8     0
NB  0.0%  3.0%   N      0     0   .900  500   Y     14.5     3
SB  0.0%  0.0%          0     0   .000    0   Y     14.5     0

PHASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                                p*        *   15.5   5    A
 2           *           *     *  *               20.5   5    A
 3           *           *           *           *     0.0  14    A

CYCLE= 60.0  LOST=24.0  SUM V/S CRIT= 0.43 TOTAL V/C= 0.72

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM q/C     C     d1     c      d2   PF    Delay LOS Avg Q  95%

EB  L-T   1800 0.72 * 0.26  60.0  15.41 1345   1.56 0.85  14.42  B  10.8   33
NB  T     1800 0.30   0.34  60.0  11.00 1214   0.00 0.85   9.35  B   3.8   12
NB  R     1800 0.72 * 0.34  60.0  13.07  516   3.96 0.85  14.48  B   4.1   13

DIR Delay LOS
EB  14.42  B
NB  11.93  B
INTERSECTION DELAY = 13.34 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
KNEELAND STREET/SURFACE ARTERY
AM PEAK HOUR  1996 NO-BUILD CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KNSAAMNB   GEOMETRICS=KNEESURF   SIGNAL=KNEESURF
LOCATED IN CBD:N
VOLUME & GEOMETRICS
                VOLUMES         # OF LANES      LANE WIDTH       CROSS
DIR  LT    TH    RT   TOTAL   LT  TH  RT       LT    TH    RT     WALK
EB  362   174   179    715     1   1   1     12.0  12.0  12.0      50
WB   51   586    24    661     0   2   1      0.0  12.0  12.0      50
NB    0     0     0      0     0   0   0      0.0   0.0   0.0       0
SB  168   484   293    945     0   3   1      0.0  12.0  12.0      50

TOTAL VOLUME =  2321

TRAFFIC & ROADWAY CONDITIONS
                    ADJ PARK               PEDESTRIANS         ARR
DIR GRADE  %HV    Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME  TYPE
EB   0.0%  2.0%    Y      0     0   .900    0    Y     19.5     3
WB   0.0%  2.0%    Y      0     0   .900    0    Y     19.5     3
NB   0.0%  0.0%           0     0   .000    0          19.5     0
SB   0.0%  2.0%    N      0     0   .900    0    N     19.5     4

PHASINGS
    EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p   l  t  r  p   l  t  r  p   l  t  r  p
 1  *  *  *                                             10.8    5    A
 2  *  *  *      *  *  *                                16.8    5    A
 3                     *                   *  *  *      17.3    5    A

CYCLE= 60.0  LOST=15.0  SUM V/S CRIT= 0.56 TOTAL V/C= 0.74

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT   v/c CM g/C     C      d1    c      d2   PF    Delay LOS Avg Q  95%

EB  L      1800 0.74 * 0.54  60.0   7.93  543    4.48 1.00   12.41  B    5.5   17
EB  T      1800 0.20   0.54  60.0   5.31  970    0.00 0.85    4.51  A    1.5    5
EB  R      1800 0.24   0.54  60.0   5.45  825    0.00 0.85    4.63  A    1.5    5
WB  L-T    1800 0.74 * 0.28  60.0  14.92 1000    2.56 0.85   14.85  B    8.5   26
WB  R      1800 0.03   0.65  60.0   2.80  989    0.00 0.85    2.38  A    0.2    1
SB  L-T    1800 0.52   0.29  60.0  13.54 1545    0.06 0.62    8.43  B    8.6   27
SB  R      1800 0.74 * 0.29  60.0  14.68  438    5.64 0.69   13.98  B    3.9   12

DIR Delay LOS
EB   8.54  B
WB  14.42  B
SB  10.04  B
INTERSECTION DELAY = 10.85 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
KNEELAND STREET/SURFACE ARTERY
PM PEAK HOUR  1996 NO-BUILD CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KNSAPMNB   GEOMETRICS=KNEESURF   SIGNAL=KNEESURF
LOCATED IN CBD:N
VOLUME & GEOMETRICS
                VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT   TOTAL  LT  TH  RT       LT    TH    RT     WALK
EB  540   186   536   1262    1   1   1     12.0  12.0  12.0     50
WB   97   347    15    459    0   2   1      0.0  12.0  12.0     50
NB    0     0     0      0    0   0   0      0.0   0.0   0.0      0
SB  131  1879   288   2298    0   4   1      0.0  12.0  12.0     50

TOTAL VOLUME =  4019

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME TYPE
EB   0.0%  2.0%   Y     0     0   .900    0   Y     19.5    3
WB   0.0%  2.0%   Y     0     0   .900    0   Y     19.5    3
NB   0.0%  0.0%         0     0   .000    0         19.5    0
SB   0.0%  2.0%   N     0     0   .900    0   N     19.5    4

PHASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
   l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1 *  *  *                                         29.0   5    A
 2 *  *  *     *  *  *                             13.6   5    A
 3                   *              *  *  *        32.3   5    A

CYCLE= 90.0  LOST=15.0  SUM V/S CRIT= 0.80 TOTAL V/C= 0.96

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C    C    .d1    c      d2   PF    Delay LOS Avg Q  95%

EB  L      1800 0.96 * 0.53  90.0  15.39  625   20.45 1.00   35.84  D  12.8   39
EB  T      1800 0.22   0.53  90.0   8.56  944    0.00 0.85    7.28  B   2.4    8
EB  R      1800 0.74   0.53  90.0  12.47  802    3.14 0.85   13.27  B   7.0   22
WB  L-T    1800 0.96 * 0.15  90.0  28.81  540   22.33 0.85   43.46  E  13.0   40
WB  R      1800 0.02   0.57  90.0   6.50  858    0.00 0.85    5.53  B   0.2    1
SB  L-T    1800 0.96 * 0.36  90.0  21.42 2561    7.82 0.77   22.42  C  36.0  109
SB  R      1800 0.59   0.36  90.0  17.80  544    1.08 0.62   11.70  B   5.1   16

DIR Delay LOS
EB  22.04  C
WB  42.28  E
SB  21.19  C
INTERSECTION DELAY = 23.83 INTERSECTION LOS=C
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
SUMMER ST/LINCOLN ST/BEDFORD ST
AM PEAK HOUR  1996 NO-BUILD CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=SULIAMNB   GEOMETRICS=SUMMLINC   SIGNAL=SUMMLINC
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT      LT   TH   RT    WALK
EB    0   97    3   100    0  1  1     0.0 12.0 12.0    36
WB  179  276    0   455    1  1  0    12.0 12.0  0.0    33
NB  290  354  109   753    1  1  1    12.0 12.0 12.0    27
SB    0    0    0     0    0  0  0     0.0  0.0  0.0     0

TOTAL VOLUME =  1308

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK              PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .910  450   N    11.0    3
WB  0.0%  2.0%   N     0    0   .910 1000   N    11.0    3
NB  0.0%  2.0%   N     0    0   .910  850   N     8.8    3
SB  0.0%  0.0%         0    0   .000    0         8.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 24.9   5    A
 2              *  *                             *  13.3   5    A
 3     *  *        *                 *           *   6.8   5    A

CYCLE= 60.0  LOST=15.0  SUM V/S CRIT= 0.39 TOTAL V/C= 0.53

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  T     1800 0.53 * 0.11  60.0  19.05  203    0.74 0.85   16.82  C   1.6    6
EB  R     1800 0.04   0.11  60.0  17.98   90    0.00 0.85   15.28  C   0.0    1
WB  L     1800 0.53 * 0.22  60.0  15.65  374    0.40 1.00   16.05  C   2.6    9
WB  T     1800 0.41   0.42  60.0   9.30  745    0.00 0.85    7.91  B   2.9   10
NB  L     1800 0.45   0.42  60.0   9.60  703    0.00 1.00    9.60  B   3.1   10
NB  T     1800 0.53 * 0.42  60.0   9.97  740    0.20 0.85    8.65  B   3.8   12
NB  R     1800 0.43   0.42  60.0   9.51  277    0.00 0.85    8.08  B   1.2    4

DIR Delay LOS
EB  16.77  C
WB  11.11  B
NB   8.94  B
INTERSECTION DELAY = 10.29 INTERSECTION LOS=B
```

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1985 HCM - CHAPTER 9: SIGNALIZED
SUMMER ST/LINCOLN ST/BEDFORD ST
PM PEAK HOUR  1996 NO-BUILD CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=SULIPMNB   GEOMETRICS=SUMMLINC   SIGNAL=SUMMLINC
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES       # OF LANES     LANE WIDTH      CROSS
DIR  LT    TH   RT  TOTAL  LT TH RT      LT   TH   RT      WALK
EB    0   162    5   167    0  1  1     0.0 12.0 12.0      36
WB  211   200    0   411    1  1  0    12.0 12.0  0.0      33
NB   58   243  143   444    1  1  1    12.0 12.0 12.0      27
SB    0     0    0     0    0  0  0     0.0  0.0  0.0       0

TOTAL VOLUME =  1022

TRAFFIC & ROADWAY CONDITIONS
                   ADJ PARK                PEDESTRIANS         ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N      0     0   .920  450   N     11.0     3
WB  0.0%  2.0%    N      0     0   .920 1000   N     11.0     3
NB  0.0%  2.0%    N      0     0   .920  850   N      8.8     3
SB  0.0%  0.0%           0     0   .000    0          8.8     0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                  22.5   5    A
 2              *  *                             *   13.0   5    A
 3     *  *        *                 *           *    9.5   5    A

CYCLE= 60.0  LOST=15.0  SUM V/S CRIT= 0.47 TOTAL V/C= 0.62

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C      d1    c      d2   PF   Delay LOS Avg Q  95%

EB  T      1800 0.62 * 0.16  60.0  17.92  282    3.14 0.85  17.90  C    2.5    8
EB  R      1800 0.04   0.16  60.0  16.26  126    0.00 0.85  13.82  B    0.1    1
WB  L      1800 0.62 * 0.22  60.0  16.16  368    2.42 1.00  18.58  C    3.0   10
WB  T      1800 0.27   0.46  60.0   7.60  818    0.00 0.85   6.46  B    2.0    7
NB  L      1800 0.10   0.37  60.0   9.27  634    0.00 1.00   9.27  B    0.7    3
NB  T      1800 0.40   0.37  60.0  10.48  667    0.00 0.85   8.91  B    2.8    9
NB  R      1800 0.62 * 0.37  60.0  11.64  249    3.54 0.85  12.91  B    1.6    6

DIR Delay LOS
EB  17.77  C
WB  12.68  B
NB  10.25  B
INTERSECTION DELAY = 12.45 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/WASHINGTON STREET
PM PEAK HOUR  1996 NO-BUILD CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=ESWANBPM   GEOMETRICS=ESSXWASH   SIGNAL=ESSXWASH
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES          # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH    RT  TOTAL  LT TH RT        LT    TH    RT     WALK
EB  213 1058     0  1271    0  3  0       0.0  12.0   0.0      35
WB    0    0     0     0    0  0  0       0.0   0.0   0.0      35
NB    0  371   367   738    0  2  1       0.0  12.0  12.0      50
SB    0    0     0     0    0  0  0       0.0   0.0   0.0      50

TOTAL VOLUME =  2009

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK             PEDESTRIANS         ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%    N     0     0   .900  650   Y    10.8     3
WB  0.0%  0.0%          0     0   .000    0   Y    10.8     0
NB  0.0%  3.0%    N     0     0   .900  500   Y    14.5     3
SB  0.0%  0.0%          0     0   .000    0   Y    14.5     0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                             *           *  26.8   5    A
 2           *           *  *  *                    24.2   5    A
 3           *           *           *           *   0.0  14    A

CYCLE= 75.0  LOST=24.0  SUM V/S CRIT= 0.57 TOTAL V/C= 0.84

LEVEL OF SERVICE WORKSHEET
DIR L GRP   SAT  v/c CM g/C     C     d1     c      d2   PF    Delay LOS Avg Q  95%

EB  L-T   1800 0.84 * 0.36  75.0  16.81 1853    2.97 0.85   16.81  C  18.9    58
NB  T     1800 0.38   0.32  75.0  14.89 1145    0.00 0.85   12.66  B   5.8    18
NB  R     1800 0.84 * 0.32  75.0  17.92  486   10.09 0.85   23.81  C   6.4    20

DIR Delay LOS
EB  16.81  C
NB  18.07  C
INTERSECTION DELAY = 17.25 INTERSECTION LOS=C
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/WASHINGTON STREET
AM PEAK HOUR  1996 NO-BUILD CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=ESWANBAM   GEOMETRICS=ESSXWASH   SIGNAL=ESSXWASH
LOCATED IN CBD:N
VOLUME & GEOMETRICS
                VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT  TOTAL   LT TH RT       LT   TH   RT       WALK
EB  255  965    0  1220    0  3  0       0.0 12.0  0.0       35
WB    0    0    0     0    0  0  0       0.0  0.0  0.0       35
NB    0  488  138   626    0  2  1       0.0 12.0 12.0       50
SB    0    0    0     0    0  0  0       0.0  0.0  0.0       50

TOTAL VOLUME =  1846

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK              PEDESTRIANS         ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%   N     0     0   .900  240   Y    10.8     3
WB  0.0%  0.0%         0     0   .000    0   Y    10.8     0
NB  0.0%  3.0%   N     0     0   .900  300   Y    14.5     3
SB  0.0%  0.0%         0     0   .000    0   Y    14.5     0

PHASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND   SOUTHBOUND GREEN  Y+R PFE/ACT
   l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
1  *  *                             *           *  23.2   5    A
2           *           *     *  *                 12.8   5    A
3           -           *           *           -   0.0  14    A

CYCLE= 60.0  LOST=24.0  SUM V/S CRIT= 0.45 TOTAL V/C= 0.75

LEVEL OF SERVICE WORKSHEET
DIR L GRF  SAT  v/c CM g/C    C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  L-T   1800 0.75 * 0.39  60.0  12.10 1989    1.37 0.85   11.45  B  13.9   43
NB  T     1800 0.75 * 0.21  60.0  16.78  759    3.50 0.85   17.23  C   7.1   22
NB  R     1800 0.48   0.21  60.0  15.68  323    0.00 0.85   13.33  B   2.0    7

DIR Delay LOS
EB  11.45  B
NB  16.40  C
INTERSECTION DELAY = 13.06 INTERSECTION LOS=B
```

```
SASAKI ASSOCIATES INC.    USING CINCH (VER 2.1) BY SASAKI ASSOCIATES, INC.              10-11-1989  16:26:30
PROJECT NAME: COMMONWEALTH CENTER FEIR  PROJECT NUMBER: 8570.03  BY: SHR

1985 HCM - CHAPTER 9: SIGNALIZED
BOYLSTON ST/CHARLES ST
AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=CHBOBDAM   GEOMETRICS=CHASBOYL   SIGNAL=CHASBOYL
LOCATED IN CBD:N
VOLUME & GEOMETRICS
              VOLUMES         # OF LANES      LANE WIDTH       CROSS
DIR  LT   TH    RT  TOTAL   LT  TH  RT     LT    TH    RT     WALK
EB  953 1006     0  1959     2   2   0   15.0  15.0   0.0      60
WB    0    0   501   501     0   0   1    0.0   0.0  15.0       0
NB    0  854   223  1077     0   2   1    0.0  13.0  13.0      40
SB    0    0     0     0     0   0   0    0.0   0.0   0.0      48

TOTAL VOLUME =  3537

TRAFFIC & ROADWAY CONDITIONS
                     ADJ PARK                 PEDESTRIANS          ARR
DIR GRADE  %HV    Y/N MOVES BUSES  PHF  CROSS  BUT MIN TIME  TYPE
EB   0.0%  3.0%    Y      3     0   .900  150    Y     17.0     4
WB   0.0%  3.0%    N      0     0   .900  150    Y     17.0     4
NB   0.0%  3.0%    Y      3     0   .900  100    Y     19.0     4
SB   0.0%  3.0%    N      0     0   .900  100    Y     19.0     0

PHASINGS
     EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND  GREEN  Y+R PRE/ACT
     l  t  r  p   l  t  r  p   l  t  r  p   l  t  r  p
 1            *         *         *  *                   24.4   5     A
 2   *  *               *               *                28.6   5     A
 3            *            *            *            *    0.0  12     A

CYCLE= 75.0  LOST=22.0  SUM V/S CRIT= 0.59 TOTAL V/C= 0.84

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C      d1     c      d2    PF    Delay LOS Avg Q  95%

EB  L     1800 0.81    0.38  75.0  15.79 1370    3.19 1.00   18.97  C  14.1    43
EB  T     1800 0.84 *  0.38  75.0  16.01 1403    3.80 0.72   14.35  B  14.4    44
WB  R     1800 0.43    0.77  75.0   2.20 1282    0.00 0.62    1.37  A   2.6     9
NB  T     1800 0.84 *  0.33  75.0  17.83 1191    4.43 0.72   16.13  C  13.3    41
NB  R     1800 0.55    0.33  75.0  15.83  448    0.73 0.62   10.27  B   3.5    11

DIR Delay LOS
EB  16.60  C
WB   1.37  A
NB  14.97  B
INTERSECTION DELAY = 14.03 INTERSECTION LOS=B
```

```
SASAKI ASSOCIATES INC.   USING CINCH (VER 2.1) BY SASAKI ASSOCIATES, INC.                10-11-1989  16:29:09
PROJECT NAME: COMMONWEALTH CENTER FEIR  PROJECT NUMBER: 8570.03  BY: SHR

1985 HCM - CHAPTER 9: SIGNALIZED
BOYLSTON ST/CHARLES ST
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=CHBOBDPM   GEOMETRICS=CHASBOYL   SIGNAL=CHASBOYL
LOCATED IN CBD:N
VOLUME & GEOMETRICS
              VOLUMES           # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT  TOTAL  LT TH RT        LT    TH    RT      WALK
EB  902   987     0  1889    2  2  0      15.0 15.0   0.0       60
WB    0     0   623   623    0  0  1       0.0  0.0  15.0        0
NB    0  1090   198  1288    0  2  1       0.0 13.0  13.0       40
SB    0     0     0     0    0  0  0       0.0  0.0   0.0       48

TOTAL VOLUME =  3800

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK              PEDESTRIANS         ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%    Y     3     0   .900  150   Y     17.0    4
WB  0.0%  3.0%    N     0     0   .900  150   Y     17.0    4
NB  0.0%  3.0%    Y     3     0   .900  150   Y     19.0    4
SB  0.0%  3.0%    N     0     0   .900  150   Y     19.0    0

PHASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
   l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
1           *        *        *  *                 35.7   5    A
2  *  *              *              *              32.3   5    A
3           *           *           *           *   0.0  12    A

CYCLE= 90.0  LOST=22.0  SUM V/S CRIT= 0.66 TOTAL V/C= 0.87

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C      d1    c       d2   PF    Delay LOS Avg Q  95%

EB  L      1800 0.82    0.36  90.0  19.91 1297    3.56 1.00   23.47  C  16.5    51
EB  T      1800 0.87 *  0.36  90.0  20.50 1318    5.52 0.74   19.21  C  17.6    54
WB  R      1800 0.51    0.81  90.0   2.09 1345    0.06 0.62    1.34  A   3.3    11
NB  T      1800 0.87 *  0.40  90.0  19.04 1455    5.05 0.74   17.78  C  18.3    56
NB  R      1800 0.40    0.40  90.0  14.79  547    0.00 0.62    9.17  B   3.3    11

DIR Delay LOS
EB  21.24  C
WB   1.34  A
NB  16.51  C
INTERSECTION DELAY = 16.49 INTERSECTION LOS=C
```

```
SASAKI ASSOCIATES INC.   USING CINCH (VER 2.1) BY SASAKI ASSOCIATES, INC.                    10-11-1989  16:32:14
PROJECT NAME: COMMONWEALTH CENTER FEIR  PROJECT NUMBER: 8570.03  BY: SHR

1985 HCM - CHAPTER 9: SIGNALIZED
TREMONT STREET/BOYLSTON STREET
AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=TRBOBDAM   GEOMETRICS=TREMBOYL   SIGNAL=TREMBOYL
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT      LT    TH    RT     WALK
EB    0 1001  213  1214    0  2  0      0.0 12.0  0.0     48
WB    0    0    0     0    0  0  0      0.0  0.0  0.0      0
NB    0    0    0     0    0  0  0      0.0  0.0  0.0      0
SB  731  844  496  2071    1  2  1     12.0 12.0 12.0     48

TOTAL VOLUME =  3285

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK              PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  5.0%    Y     2     0   .900   50   Y    19.0    3
WB  0.0%  0.0%          0     0   .000    0   Y    19.0    0
NB  0.0%  0.0%          0     0   .000    0   Y    14.0    0
SB  0.0%  8.0%    N     0     0   .900   50   Y    14.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R  FRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *                                   *  *  45.8   5    A
 2                                      *  *  -     52.2   5    A
 3           *           *           *           *   0.0  12    A

CYCLE=120.0  LOST=22.0  SUM V/S CRIT= 0.93 TOTAL V/C= 1.14

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  T-R   1800 1.14 * 0.38 120.0  30.78 1246   55.92 0.85   73.69  F   49.8  150
SB  L     1800 1.14 * 0.43 120.0  28.80  715   61.13 1.00   89.92  F   34.0  103
SB  T     1800 0.65   0.43 120.0  20.36 1505    0.82 0.85   18.00  C   17.7   54
SB  R     1800 0.44   0.86 120.0   1.46 1263    0.00 0.85    1.24  A    2.6    9

DIR Delay LOS
EB  73.69  F
SB  38.95  D
INTERSECTION DELAY = 52.02 INTERSECTION LOS=E
```

```
SASAKI ASSOCIATES INC.   USING CINCH (VER 2.1) BY SASAKI ASSOCIATES, INC.                   10-11-1989  16:38:40
PROJECT NAME: COMMONHEALTH CENTER FEIR  PROJECT NUMBER: 8570.03  BY: SHR

1985 HCM - CHAPTER 9: SIGNALIZED
TREMONT STREET/BOYLSTON STREET
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=TRE08DPM   GEOMETRICS=TREMBOYL   SIGNAL=TREMBOYL
LOCATED IN CBD:N
VOLUME & GEOMETRICS
              VOLUMES         # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT        LT   TH   RT       WALK
EB    0  905  263  1168    0  2  0       0.0 12.0  0.0       48
WB    0    0    0     0    0  0  0       0.0  0.0  0.0        0
NB    0    0    0     0    0  0  0       0.0  0.0  0.0        0
SB  547 1775  893  3215    0  3  1       0.0 12.0 12.0       48

TOTAL VOLUME =  4383

TRAFFIC & ROADWAY CONDITIONS
                   ADJ PARK                 PEDESTRIANS          ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%   Y     2     0   .900   50   Y     19.0     3
WB  0.0%  0.0%         0     0   .000    0   Y     19.0     0
NB  0.0%  0.0%         0     0   .000    0   Y     14.0     0
SB  0.0%  2.0%   N     0     0   .900   50   Y     14.0     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *                                   *  *  42.6   5    A
 2                                      *  *  *     55.4   5    A
 3           *           *           *           *   0.0  12    A

CYCLE=120.0  LOST=22.0  SUM V/S CRIT= 0.97 TOTAL V/C= 1.18

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C      d1     c      d2   PF   Delay LOS Avg Q  95%

EB  T-R   1800 1.18 * 0.36 120.0  32.73 1150   71.80 0.85   88.85  F  55.6  168
SB  L-T   1600 1.15 * 0.46 120.0  29.17 2396   67.89 0.85   82.50  F 100.0  301
SB  R     1800 0.79   0.86 120.0   2.81 1263    2.82 0.85    4.78  A   4.7   15

DIR Delay LOS
EB  88.85  F
SB  62.37  F
INTERSECTION DELAY = 69.32 INTERSECTION LOS=F
```

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1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/WASHINGTON STREET
AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=ESWABDAM   GEOMETRICS=ESSXWASH   SIGNAL=ESSXWASH
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT      LT   TH   RT    WALK
EB  303 1099    0  1402    0  3  0     0.0 12.0  0.0     35
WB    0    0    0     0    0  0  0     0.0  0.0  0.0     35
NB    0  606  138   744    0  2  1     0.0 12.0 12.0     50
SB    0    0    0     0    0  0  0     0.0  0.0  0.0     50

TOTAL VOLUME =  2146

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK               PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%   N      0     0  .900  240   Y    10.8    3
WB  0.0%  0.0%          0     0  .000    0   Y    10.8    0
NB  0.0%  3.0%   N      0     0  .900  300   Y    14.5    3
SB  0.0%  0.0%          0     0  .000    0   Y    14.5    0

PHASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
   l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
1  *  *                             *           *  28.8   5    A
2           *           *     *  *                 17.2   5    A
3           *           *           *           *   0.0  I4    A

CYCLE= 70.0  LOST=24.0  SUM V/S CRIT= 0.53 TOTAL V/C= 0.81

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C    C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  L-T    1800 0.81 * 0.41  70.0  13.83 2116   2.07 0.85   13.51  B  17.8   54
NB  T      1800 0.81 * 0.25  70.0  18.88  873   4.82 0.85   20.14  C   9.9   31
NB  R      1800 0.41   0.25  70.0  16.83  371   0.00 0.85   14.30  B   2.2    8

DIR Delay LOS
EB  13.51  B
NB  19.10  C
INTERSECTION DELAY = 15.38 INTERSECTION LOS=C
```

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1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/WASHINGTON STREET
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=ESWABDPM   GEOMETRICS=ESSXWASH   SIGNAL=ESSXWASH
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT      LT   TH   RT    WALK
EB  397 1568    0  1965    0  3  0     0.0 12.0  0.0    35
WB      0    0    0     0    0  0  0     0.0  0.0  0.0    35
NB      0  443  367   810    0  2  1     0.0 12.0 12.0    50
SB      0    0    0     0    0  0  0     0.0  0.0  0.0    50

TOTAL VOLUME =  2775

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%   N     0    0   .900  650   Y    10.8    3
WB  0.0%  0.0%         0    0   .000    0   Y    10.8    0
NB  0.0%  3.0%   N     0    0   .900  500   Y    14.5    3
SB  0.0%  0.0%         0    0   .000    0   Y    14.5    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                             *           *  60.7   5    A
 2           *           *     *  *                 35.3   5    A
 3           *           *           *           *   0.0  14    A

CYCLE=120.0  LOST=24.0  SUM V/S CRIT= 0.74 TOTAL V/C= 0.92

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF   Delay LOS Avg Q  95%

EB  L-T   1800 0.92 * 0.51 120.0  20.82 2610    4.75 0.85   21.74  C  36.0  109
NB  T     1800 0.50   0.29 120.0  26.60 1043    0.00 0.85   22.61  C  11.6   36
NB  R     1800 0.92 * 0.29 120.0  31.16  443   19.32 0.85   42.91  E  11.1   34

DIR Delay LOS
EB  21.74  C
NB  31.56  D
INTERSECTION DELAY = 24.47 INTERSECTION LOS=C
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1985 HCM - CHAPTER 9: SIGNALIZED
TREMONT STREET/STUART STREET
AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=TRSTBDAM   GEOMETRICS=TREMSTU    SIGNAL=TREMSTU
LOCATED IN CBD:N
VOLUME & GEOMETRICS
                VOLUMES          # OF LANES       LANE WIDTH       CROSS
DIR  LT    TH    RT   TOTAL   LT  TH  RT       LT    TH    RT      WALK
EB     0   674   237    911    0   2   1      0.0  13.0  13.0        2
WB   200   758     0    958    0   2   0      0.0  15.0   0.0       80
NB     0     0     0      0    0   0   0      0.0   0.0   0.0        0
SB   178   612   260   1050    0   3   1      0.0  11.0  11.0       44

TOTAL VOLUME =  2919

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK               PEDESTRIANS         ARR
DIR GRADE %HV    Y/N MOVES BUSES   PHF  CROSS BUT MIN TIME  TYPE
EB  0.0%  3.0%    N      0     0   .900  150   Y     27.0     4
WB  0.0%  3.0%    Y      0     0   .900  150   Y     27.0     4
NB  0.0%  0.0%           0     0   .000    0   Y     13.0     0
SB  0.0%  3.0%    N      0     0   .900  150   Y     13.0     4

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                                      *  *  *     16.7    5    A
 2     *  *     *  *                             *  33.3    5    A
 3          *           *           *           *   0.0   10    A

CYCLE= 70.0  LOST=20.0  SUM V/S CRIT= 0.59 TOTAL V/C= 0.83

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT   v/c CM g/C      C      d1     c       d2    PF    Delay LOS Avg Q  95%

EB  T      1800 0.45    0.48   70.0   9.29 1745     0.00 0.62    5.76  B    7.6    24
EB  R      1800 0.36    0.48   70.0   8.78  742     0.00 0.62    5.45  B    2.7     9
WB  L-T    1800 0.83 *  0.48   70.0  12.09 1343     3.84 0.72   11.52  B   10.8    33
SB  L-T    1800 0.79    0.24   70.0  19.01 1225     2.96 0.71   15.51  C   13.0    40
SB  R      1800 0.83 *  0.24   70.0  19.26  347    12.95 0.72   23.29  C    4.6    15

DIR Delay LOS
EB   5.68  B
WB  11.52  B
SB  17.31  C
INTERSECTION DELAY = 11.85 INTERSECTION LOS=B
```

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SASAKI ASSOCIATES INC.   USING CINCH (VER 2.1) BY SASAKI ASSOCIATES, INC.              10-12-1989  08:42:13
PROJECT NAME: COMMONWEALTH CENTER FEIR  PROJECT NUMBER: 8570.08  BY: SHR

1985 HCM - CHAPTER 9: SIGNALIZED
TREMONT STREET/STUART STREET
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=TRSTBDPM   GEOMETRICS=TREMSTU    SIGNAL=TREMSTU
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT     LT   TH   RT     WALK
EB    0  784  376  1160    0  2  1    0.0 13.0 13.0      2
WB  232  659    0   891    1  1  0   15.0 15.0  0.0     80
NB    0    0    0     0    0  0  0    0.0  0.0  0.0      0
SB  259 1343  336  1938    0  3  1    0.0 11.0 11.0     44

TOTAL VOLUME =  3989

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%   N     0     0   .900  150   Y    27.0    4
WB  0.0%  3.0%   Y     0     0   .900  150   Y    27.0    4
NB  0.0%  0.0%         0     0   .000    0   Y    13.0    0
SB  0.0%  3.0%   N     0     0   .900  150   Y    13.0    4

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                                      *  *  *      42.9   5    A
 2     *  *     *  *                             *   57.1   5    A
 3           *           *           *           *    0.0  10    A

CYCLE=120.0  LOST=20.0  SUM V/S CRIT= 0.89 TOTAL V/C= 1.07

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C      d1    c      d2   PF    Delay LOS Avg Q  95%

EB  T      1800 0.52    0.48 120.0  16.69 1745    0.08 0.62   10.40  B  15.2   47
EB  R      1800 0.56    0.48 120.0  17.11  741    0.54 0.62   10.94  B   7.3   23
WB  L      1800 1.07 *  0.48 120.0  25.40  242   59.93 0.80   68.13  F   8.6   27
WB  T      1800 0.79    0.48 120.0  20.05  929    3.86 0.71   16.89  C  12.8   39
SB  L-T    1800 1.07 *  0.36 120.0  30.41 1838   31.88 0.80   49.73  E  51.0  154
SB  R      1800 0.72    0.36 120.0  25.32  521    3.92 0.68   19.77  C   8.0   25

DIR Delay LOS
EB  10.57  B
WB  30.23  D
SB  44.93  E
INTERSECTION DELAY = 31.97 INTERSECTION LOS=D
```

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SASAKI ASSOCIATES INC.   USING CINCH (VER 2.1) BY SASAKI ASSOCIATES, INC.                  10-12-1989  08:45:46
PROJECT NAME: COMMONWEALTH CENTER FEIR  PROJECT NUMBER: 8570.03  BY: SHR

1985 HCM - CHAPTER 9: SIGNALIZED
KNEELAND STREET/WASHINGTON STREET
AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KNWABDAM   GEOMETRICS=KNEEWASH   SIGNAL=KNEEWASH
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES          # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT     LT   TH   RT      WALK
EB   87  710   58   855    1  2  0   12.0 12.0  0.0      75
WB  125  748  149  1022    0  2  1    0.0 12.0 12.0      75
NB  144  550  281   975    0  2  0    0.0 15.0  0.0      80
SB    0    0    0     0    0  0  0    0.0  0.0  0.0      40

TOTAL VOLUME =  2852

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS          ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%   N     0     0  .900  150   Y    20.8    3
WB  0.0%  3.0%   Y     0     0  .900  150   Y    20.8    3
NB  0.0%  3.0%   Y     0     0  .900  150   Y    22.0    3
SB  0.0%  0.0%         0     0  .000  150   Y    22.0    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 22.5   5    A
 2  *  *  *     *  *  *              *           *  27.5   5    A

CYCLE= 60.0  LOST=10.0  SUM V/S CRIT= 0.71 TOTAL V/C= 0.86

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF   Delay LOS Avg Q  95%

EB  L      1800 0.53   0.46  60.0   8.83  184    0.80 0.85   8.19  B   0.9    3
EB  T-R    1800 0.56   0.46  60.0   9.03 1596    0.24 0.85   7.88  B   7.7   24
WB  L-T    1800 0.86 * 0.46  60.0  11.04 1188    5.27 0.85  13.86  B   9.2   29
WB  R      1800 0.26   0.46  60.0   7.62  632    0.00 0.85   6.48  B   1.5    5
NB  L-T-R  1800 0.86 * 0.38  60.0  13.10 1328    4.74 0.85  15.16  C  11.6   36

DIR Delay LOS
EB   7.91  B
WB  12.83  B
NB  15.16  C
INTERSECTION DELAY = 12.16 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
KNEELAND STREET/WASHINGTON STREET
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KNWABDPM   GEOMETRICS=KNEEWASH   SIGNAL=KNEEWASH
LOCATED IN CBD:N
VOLUME & GEOMETRICS
                 VOLUMES         # OF LANES      LANE WIDTH       CROSS
DIR  LT    TH    RT   TOTAL   LT  TH  RT       LT    TH    RT     WALK
EB   182   795    66   1043    1   2   0     12.0  12.0   0.0      75
WB   116   723   177   1016    0   2   1      0.0  12.0  12.0      75
NB   167   451   398   1016    0   2   0      0.0  15.0   0.0      80
SB     0     0     0      0    0   0   0      0.0   0.0   0.0      40

TOTAL VOLUME =  3075

TRAFFIC & ROADWAY CONDITIONS
                   ADJ PARK                 PEDESTRIANS          ARR
DIR GRADE  %HV   Y/N MOVES BUSES   PHF  CROSS BUT MIN TIME  TYPE
EB   0.0%  3.0%   N      0     0   .900  150   Y     20.8     3
WB   0.0%  3.0%   Y      0     0   .900  150   Y     20.8     3
NB   0.0%  3.0%   Y      0     0   .900  150   Y     22.0     3
SB   0.0%  0.0%          0     0   .000  150   Y     22.0     0

PHASINGS
   EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND GREEN  Y+R PRE/ACT
   l  t  r  p   l  t  r  p   l  t  r  p   l  t  r  p
1           *            *   *  *  *                 31.4    5    A
2  *  *  *      *  *  *                *            *  48.6    5    A

CYCLE= 90.0  LOST=10.0  SUM V/S CRIT= 0.86 TOTAL V/C= 0.99

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  L      1800 0.99 * 0.54  90.0  15.53  204   46.19 0.85   52.47  E    5.0   16
EB  T-R    1800 0.53   0.54  90.0  10.15 1884    0.10 0.85    8.71  B   11.0   34
WB  L-T    1800 0.77   0.54  90.0  12.35 1274    2.44 0.85   12.57  B   10.7   33
WB  R      1800 0.26   0.54  90.0   8.42  746    0.00 0.85    7.16  B    2.3    8
NB  L-T-R  1800 0.99 * 0.35  90.0  22.17 1196   18.30 0.85   34.40  D   23.2   71

DIR Delay LOS
EB  16.04  C
WB  11.67  B
NB  34.40  D
INTERSECTION DELAY = 20.70 INTERSECTION LOS=C
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/SURFACE ARTERY/LINCOLN STREET
AM PEAK HOUR  1996 BUILD CONDITION  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=ESSUBDAM   GEOMETRICS=ESSXSURF   SIGNAL=ESSXSURF
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES        # OF LANES      LANE WIDTH     CROSS
DIR  LT    TH    RT   TOTAL  LT TH RT      LT    TH    RT     WALK
EB   778    36     0    814    2  1  0    12.0 12.0  0.0     36
WB    85   795    14    894    0  2  0     0.0 12.0  0.0     32
NB    79   412    16    507    1  2  0    12.0 12.0  0.0     75
SB    74   533     0    607    0  3  0     0.0 12.0  0.0     75

TOTAL VOLUME =  2822

TRAFFIC & ROADWAY CONDITIONS
               ADJ PARK                PEDESTRIANS         ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%   Y     1     0   .900   50   Y    16.0    3
WB  0.0%  3.0%   Y     1     0   .900   50   Y    16.0    3
NB  0.0%  3.0%   N     0     0   .900   50   Y    25.0    3
SB  0.0%  3.0%   N     0     0   .900   50   Y    25.0    3

PHASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
   l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
1  *  *                                             34.5   5    A
2                          *  *  *     *  *         21.0   5    A
3              *  *  *                              33.5   5    A
4           *           *           *           *    6.0  10    A

CYCLE=120.0  LOST=25.0  SUM V/S CRIT= 0.77 TOTAL V/C= 0.97

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C    C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  L      1800 0.97 * 0.29 120.0  32.05  939   16.82 1.00   48.87  E  25.5   77
EB  T      1800 0.09   0.29 120.0  23.73  457    0.00 0.85   20.17  C   0.9    4
WB  L T R  1800 0.97 * 0.32 120.0  30.45 1079   15.41 0.85   38.98  D  25.2   77
NB  L      1800 0.93   0.18 120.0  36.70   95   54.29 0.85   77.34  F   3.6   12
NB  T R    1800 0.78   0.18 120.0  35.53  642    5.03 0.85   34.48  D  13.0   40
SB  L T    1800 0.97 * 0.18 120.0  37.02  768   19.04 0.85   47.65  E  20.8   63

DIR Delay LOS
EB  47.66  E
WB  38.98  D
NB  40.89  E
SB  47.65  E
INTERSECTION DELAY = 43.73 INTERSECTION LOS=E
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/SURFACE ARTERY/LINCOLN STREET
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=ESSUBDPM   GEOMETRICS=ESSXSURF   SIGNAL=ESSXSURF
LOCATED IN CBD:N
VOLUME & GEOMETRICS
               VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT    TH    RT  TOTAL  LT TH RT       LT    TH    RT    WALK
EB 1112    90     0  1202    2  1  0     12.0 12.0  0.0     36
WB   73   448    13   534    0  2  0      0.0 12.0  0.0     32
NB   48   756    15   819    1  2  0     12.0 12.0  0.0     75
SB   38  1318     0  1356    0  3  0      0.0 12.0  0.0     75

TOTAL VOLUME =  3911

TRAFFIC & ROADWAY CONDITIONS
                   ADJ PARK               PEDESTRIANS         ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%    Y     1     0   .900   50   Y    16.0    3
WB  0.0%  3.0%    Y     1     0   .900   50   Y    16.0    3
NB  0.0%  3.0%    N     0     0   .900   50   Y    25.8    3
SB  0.0%  3.0%    N     0     0   .900   50   Y    25.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                                            38.0   5    A
 2                          *  *  *     *  *        38.0   5    A
 3                 *  *  *                          18.2   5    A
 4           *           *           *           *   0.0  10    A

CYCLE=120.0  LOST=25.0  SUM V/S CRIT= 0.97 TOTAL V/C= 1.23

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF   Delay LOS Avg Q  95%

EB  L     1800 1.23 * 0.32 120.0  34.62 1056   86.55 1.00  121.17  F  68.0  205
EB  T     1800 0.19   0.32 120.0  22.26  514    0.00 0.85   18.92  C   2.3    8
WB  L-T-R 1800 1.23 * 0.15 120.0  40.33  507   93.61 0.85  113.85  F  32.8   99
NB  L     1800 0.90   0.32 120.0  29.81   59   65.33 0.85   80.87  F   2.2    7
NB  T R   1800 0.80   0.32 120.0  28.58 1119    3.04 0.85   27.38  D  19.5   59
SB  L T   1800 1.23 * 0.32 120.0  34.85 1349   85.06 0.85  101.92  F  72.6  219

DIR Delay LOS
EB 113.85  F
WB 113.85  F
NB  30.37  D
SB 101.92  F
INTERSECTION DELAY = 92.41 INTERSECTION LOS=F
```

```
SASAKI ASSOCIATES INC.   USING CINCH (VER 2.1) BY SASAKI ASSOCIATES, INC.                10-11-1989  16:47:03
PROJECT NAME: COMMONWEALTH CENTER FEIR  PROJECT NUMBER: 8570.03  BY: SHR

1985 HCM - CHAPTER 9: SIGNALIZED
TREMONT STREET/PARK STREET
AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=TRPABDAM   GEOMETRICS=TREMPARK   SIGNAL=TREMPARK
LOCATED IN CBD:N
VOLUME & GEOMETRICS
                   VOLUMES       # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT  TOTAL  LT TH RT       LT    TH    RT     WALK
EB    0     0   330    330    0  0  1      0.0   0.0  15.0     30
WB    0     0     0      0    0  0  0      0.0   0.0   0.0      0
NB    0     0     0      0    0  0  0      0.0   0.0   0.0      0
SB    0  1198   200   1398    0  2  1      0.0  12.0  12.0     36

TOTAL VOLUME =  1728

TRAFFIC & ROADWAY CONDITIONS
                      ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  1.0%    N      0     0   .750  250   Y     14.5     3
WB  0.0%  0.0%           0     0   .000    0   Y     14.5     0
NB  0.0%  0.0%           0     0   .000    0   Y     16.0     0
SB  0.0%  3.0%    N      0     0   .900  250   Y     16.0     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                                         *  *     36.0   5    A
 2        *                                   *     24.0   5    A
 3           *                       *           *   0.0  10    A

CYCLE= 80.0  LOST=20.0  SUM V/S CRIT= 0.66 TOTAL V/C= 0.88

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C      C      d1     c        d2   PF    Delay LOS Avg Q  95%

EB  R     1800 0.88 * 0.30   80.0  20.20  502    12.83 0.85   28.08  D   7.9   25
SB  T     1800 0.88 * 0.45   80.0  15.18 1596     4.73 0.85   16.92  C  16.3   50
SB  R     1800 0.18   0.81   80.0   1.25 1225     0.00 0.85    1.07  A   0.9    4

DIR Delay LOS
EB  28.08  D
SB  14.74  B
INTERSECTION DELAY = 17.59 INTERSECTION LOS=C
```

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1985 HCM - CHAPTER 9: SIGNALIZED
TREMONT STREET/PARK STREET
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=TRPABDPM   GEOMETRICS=TREMPARK   SIGNAL=TREMPARK
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT        LT   TH   RT      WALK
EB    0    0  274   274    0  0  1       0.0  0.0 15.0      30
WB    0    0    0     0    0  0  0       0.0  0.0  0.0       0
NB    0    0    0     0    0  0  0       0.0  0.0  0.0       0
SB    0 2116  414  2530    0  2  1       0.0 12.0 12.0      36

TOTAL VOLUME =  2804

TRAFFIC & ROADWAY CONDITIONS
                ADJ PARK                 PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME  TYPE
EB  0.0%  1.0%   N      0     0  .750  500   Y     14.5     3
WB  0.0%  0.0%          0     0  .000    0   Y     14.5     0
NB  0.0%  0.0%          0     0  .000    0   Y     16.0     0
SB  0.0%  3.0%   N      0     0  .950  500   Y     16.0     3

PHASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
     l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                                          *  *      75.1    5     A
 2         *                                   *      24.9    5     A
 3            *                       *           *    0.0   10     A

CYCLE=120.0  LOST=20.0  SUM V/S CRIT= 0.88 TOTAL V/C= 1.05

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C      d1    c      d2   PF    Delay LOS Avg Q  95%

EB  R      1800 1.05 * 0.21 120.0  36.66  347   49.32 0.85   73.08  F  14.5   44
SB  T      1800 1.05 * 0.63 120.0  18.71 2221   27.15 0.95   38.98  D  45.2  136
SB  R      1800 0.33   0.88 120.0   1.00 1319    0.00 0.85    0.85  A   1.8    6

DIR Delay LOS
EB  73.08  F
SB  32.99  D
INTERSECTION DELAY = 37.65 INTERSECTION LOS=D
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
TREMONT STREET/AVERY STREET  AVERY STREET ONE WAY WB
AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=NUTRBDAM   GEOMETRICS=NUTREMAV   SIGNAL=NUTREMAV
LOCATED IN CBD:N
VOLUME & GEOMETRICS
            VOLUMES         # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT   TOTAL  LT TH RT      LT    TH    RT     WALK
EB    0     0     0       0   0  0  0     0.0   0.0   0.0      0
WB  514     0     0     514   2  0  0    12.0   0.0   0.0     35
NB    0     0     0       0   0  0  0     0.0   0.0   0.0      0
SB    0  1616     0    1616   0  4  0     0.0  12.0   0.0     40

TOTAL VOLUME =  2130

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK              PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%          0     0  .000    0         10.0    0
WB  0.0%  1.0%   Y      0     0  .850  470   N     10.0    4
NB  0.0%  0.0%          0     0  .000  110   N     14.0    0
SB  0.0%  3.0%   N      0     6  .850  114   N     14.0    3

PHASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
   l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                      *                 *        30.3   5    P
 2                *                              . 19.7   5    P

CYCLE= 60.0  LOST=10.0  SUM V/C CRIT= 0.49 TOTAL V/C= 0.59

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c       d2   PF    Delay LOS Avg Q  95%

WB  L      1800 0.59 * 0.33  60.0  12.75 1081     0.54 1.00   13.29  B    6.8   21
SB  T      1800 0.59 * 0.51  60.0   7.94 3501     0.16 1.00    8.10  B   15.7   40

DIR Delay LOS
WB  13.29  B
SB   8.10  B
INTERSECTION DELAY =  9.31 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
TREMONT STREET/AVERY STREET  AVERY STREET ONE WAY WB
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=NUTRBDPM   GEOMETRICS=NUTREMAV   SIGNAL=NUTREMAV
LOCATED IN CBD:N
VOLUME & GEOMETRICS
               VOLUMES         # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT  TOTAL  LT TH RT        LT    TH    RT      WALK
EB     0     0     0      0   0  0  0      0.0   0.0   0.0       0
WB   825     0     0    825   2  0  0     12.0   0.0   0.0      35
NB     0     0     0      0   0  0  0      0.0   0.0   0.0       0
SB     0  2390     0   2390   0  4  0      0.0  12.0   0.0      48

TOTAL VOLUME =  3215

TRAFFIC & ROADWAY CONDITIONS
                     ADJ PARK                  PEDESTRIANS          ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%          0     0   .000    0           10.0     0
WB  0.0%  1.0%   Y      0     0   .950  476    N      10.0     4
NB  0.0%  0.0%          0     0   .000  110    N      14.0     0
SB  0.0%  3.0%   N      0     0   .950  114    N      14.0     3

PHASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
   l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                       *                 *          29.3   5    P
 2              .                               *     20.7   5    P

CYCLE= 60.0  LOST=10.0  SUM V/C CRIT= 0.75 TOTAL V/C= 0.90

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1     c      d2   PF    Delay LOS Avg Q  95%

WB  L      1800 0.90 * 0.34  60.0  14.18 1135    7.76 1.00   21.95  C  13.0   40
SB  T      1800 0.90 * 0.49  60.0  10.62 3446    2.88 1.00   13.50  B  25.7   78

DIR Delay LOS
WB  21.95  C
SB  13.50  B
INTERSECTION DELAY = 15.59 INTERSECTION LOS=C
```

```
1985 HCM  -  CHAPTER 9: SIGNALIZED
WASHINGTON STREET AT REALIGNED HAYWARD PLACE/AVERY STREET
AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=NUWABDAM   GEOMETRICS=NUWASHAV   SIGNAL=NUWASHAV
LOCATED IN CBD:N
VOLUME & GEOMETRICS
              VOLUMES         # OF LANES       LANE WIDTH      CROSS
DIR  LT    TH    RT  TOTAL  LT TH RT        LT    TH    RT     WALK
EB     0     0     0      0   0  0  0       0.0   0.0   0.0     25
WB     0   132    75    207   0  2  0       0.0  12.0   0.0     25
NB   382   373     0    755   1  1  0      12.0  12.0   0.0     35
SB     0     0     0      0   0  0  0       0.0   0.0   0.0     35

TOTAL VOLUME =    962

TRAFFIC & ROADWAY CONDITIONS
                     ADJ PARK                 PEDESTRIANS           ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB   0.0%  0.0%   N      0     0  .000  200    N    10.0     0
WB   0.0%  2.0%   N      0     0  .850  200    N    10.0     3
NB   0.0%  2.0%   N      0     0  .850  200    N    15.0     4
SB   0.0%  0.0%          0     0  .000  200    N    15.0     0

PHASINGS
      EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
       l    t    r    p    l    t    r    p    l    t    r    p    l    t    r    p
 1                                        *    *    *                              27.2    5     A
 2                              *    *                        *                     7.8    5     A
 3                    *                   *                   *                   * 0.0   15     A

CYCLE= 60.0  LOST=25.0  SUM V/S CRIT= 0.34 TOTAL V/C= 0.50

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C      d1     c      d2    PF    Delay LOS Avg Q  95%

WB  T R   1800 0.50 * 0.13  60.0  18.60  437    1.29 0.85   16.98  C    3.5   12
NB  L     1800 0.50 * 0.45  60.0   9.26  766    0.74 1.00   10.00  B    4.1   13
NB  T     1800 0.54   0.45  60.0   9.03  809    0.32 0.62    5.80  B    4.0   13

DIR Delay LOS
WB  16.98  C
NB   7.92  B
INTERSECTION DELAY =  9.05 INTERSECTION LOS=B
```

```
1985 HCM  - CHAPTER 9: SIGNALIZED
WASHINGTON STREET AT REALIGNED HAYWARD PLACE/AVERY STREET
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=NUWABPM   GEOMETRICS=NUWASHAV   SIGNAL=NUWASHAV
LOCATED IN CBD:N
VOLUME & GEOMETRICS
              VOLUMES         # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT  TOTAL  LT TH RT       LT    TH    RT     WALK
EB     0     0     0     0   0  0  0      0.0   0.0   0.0     25
WB     0   236   194   430   0  2  0      0.0  12.0   0.0     25
NB   589    50     0   639   1  1  0     12.0  12.0   0.0     35
SB     0     0     0     0   0  0  0      0.0   0.0   0.0     35

TOTAL VOLUME =  1069

TRAFFIC & ROADWAY CONDITIONS
                   ADJ PARK                PEDESTRIANS          ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%    N      0     0  .900  200   N     13.3    0
WB  0.0%  2.0%    N      0     0  .950  200   N     13.3    3
NB  0.0%  2.0%    N      0     0  .950  200   N     15.8    4
SB  0.0%  0.0%           0     0  .900  200   N     15.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                          *  *  *                 39.6   5    A
 2                 *  *              *              15.4   5    A
 3           *           *           *           *   0.0  15    A

CYCLE= 80.0  LOST=25.0  SUM V/S CRIT= 0.57 TOTAL V/C= 0.83

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C      d1    c       d2   PF    Delay LOS Avg Q  95%

WB  T R   1800 0.83 * 0.19  80.0  23.56  642    7.31 0.85   26.24  D    9.3   29
NB  L     1800 0.83 * 0.49  80.0  13.15  687    5.74 1.00   18.90  C    8.6   27
NB  T     1800 0.07   0.49  80.0   8.04  881    0.00 0.62    4.98  A    0.7    3

DIR Delay LOS
WB  26.24  D
NB  17.81  C
INTERSECTION DELAY = 21.30 INTERSECTION LOS=C
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
KNEELAND STREET/SURFACE ARTERY
AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KNSABDAM   GEOMETRICS=KNEESURF   SIGNAL=KNEESURF
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES          # OF LANES     LANE WIDTH       CROSS
DIR  LT    TH    RT  TOTAL   LT TH RT      LT    TH    RT     WALK
EB  362   174   179   715     1  1  1    12.0  12.0  12.0      50
WB   51   645    24   720     0  2  1     0.0  12.0  12.0      50
NB    0     0     0     0     0  0  0     0.0   0.0   0.0       0
SB  168   551   293  1012     0  4  1     0.0  12.0  12.0      50

TOTAL VOLUME =  2447

TRAFFIC & ROADWAY CONDITIONS
                      ADJ PARK              PEDESTRIANS          ARR
DIR GRADE  %HV    Y/N MOVES BUSES   PHF  CROSS BUT MIN TIME    TYPE
EB   0.0%  2.0%    Y     0     0   .900     0   Y     19.5       3
WB   0.0%  2.0%    Y     0     0   .900     0   Y     19.5       3
NB   0.0%  0.0%          0     0   .000     0         19.5       0
SB   0.0%  2.0%    N     0     0   .900     0   N     19.5       4

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND  GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                                          10.6   5    A
 2  *  *  *     *  *  *                              17.7   5    A
 3                    *                 *  *  *      16.7   5    A

CYCLE= 60.0  LOST=15.0  SUM V/S CRIT= 0.58 TOTAL V/C= 0.77

LEVEL OF SERVICE WORKSHEET
DIR L GRP   SAT  v/c CM g/C     C     d1     c     d2   PF   Delay LOS Avg Q  95%

EB  L      1800 0.77 * 0.55  60.0   7.88   523   5.74 1.00  13.62  B    5.5   18
EB  T      1800 0.20   0.55  60.0   5.07   989   0.00 0.85   4.31  A    1.4    5
EB  R      1800 0.24   0.55  60.0   5.20   840   0.00 0.85   4.42  A    1.5    5
WB  L-T    1800 0.77 * 0.30  60.0  14.66  1053   3.00 0.85  15.01  C    9.1   28
WB  R      1800 0.03   0.66  60.0   2.72   996   0.00 0.85   2.32  A    0.2    1
SB  L-T    1800 0.44   0.28  60.0  13.53  1986   0.00 0.62   8.39  B    9.6   30
SB  R      1800 0.77 * 0.28  60.0  15.11   422   7.13 0.70  15.55  C    3.9   13

DIR Delay LOS
EB   9.05  B
WB  14.61  B
SB  10.33  B
INTERSECTION DELAY = 11.24 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
KNEELAND STREET/SURFACE ARTERY
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KNSABDPM   GEOMETRICS=KNEESURF   SIGNAL=KNEESURF
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES         # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT       LT   TH   RT      WALK
EB  540  186  536  1262    1  1  1     12.0 12.0 12.0      50
WB   97  383   15   495    0  2  1      0.0 12.0 12.0      50
NB    0    0    0     0    0  0  0      0.0  0.0  0.0       0
SB  131 2132  288  2551    0  4  1      0.0 12.0 12.0      50

TOTAL VOLUME =  4308

TRAFFIC & ROADWAY CONDITIONS
                   ADJ PARK                    PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB   0.0%  2.0%   Y     0     0   .900   0    Y     19.5    3
WB   0.0%  2.0%   Y     0     0   .900   0    Y     19.5    3
NB   0.0%  0.0%         0     0   .000   0          19.5    0
SB   0.0%  2.0%   N     0     0   .900   0    N     19.5    4

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p. l  t  r  p  l  t  r  p
 1  *  *  *                                          36.8   5    A
 2  *  *  *     *  *  *                              18.3   5    A
 3                    *                 *  *  *      44.9   5    A

CYCLE=115.0  LOST=15.0  SUM V/S CRIT= 0.86 TOTAL V/C= 0.99

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C    C      d1    c      d2   PF    Delay LOS Avg Q  95%

EB  L     1800 0.99 * 0.52 115.0  20.73  603   27.06 1.00   47.79  E  16.9   52
EB  T     1800 0.22   0.52 115.0  11.26  932    0.00 0.85    9.57  B   3.2   10
EB  R     1800 0.75   0.52 115.0  16.40  792    3.42 0.85   16.85  C   9.1   28
WB  L-T   1800 0.99 * 0.16 115.0  36.69  563   27.97 0.85   54.96  E  17.7   54
WB  R     1800 0.02   0.59 115.0   7.31  899    0.00 0.85    6.21  B   0.2    1
SB  L-T   1800 0.99 * 0.39 115.0  26.54 2783   12.04 0.78   30.00  D  51.7  156
SB  R     1800 0.54   0.39 115.0  20.59  591    0.42 0.62   13.03  B   6.2   20

DIR Delay LOS
EB  29.02  D
WB  53.55  E
SB  28.24  D
INTERSECTION DELAY = 31.34 INTERSECTION LOS=D
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
SUMMER ST/LINCOLN ST/BEDFORD ST
AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=SULIAMNB   GEOMETRICS=SUMMLINC   SIGNAL=SUMMLINC
LOCATED IN CBD:N
VOLUME & GEOMETRICS
              VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT  TOTAL  LT TH RT       LT    TH    RT    WALK
EB    0    97     3    100   0  1  1      0.0  12.0  12.0     36
WB  179   276     0    455   1  1  0     12.0  12.0   0.0     33
NB  290   354   109    753   1  1  1     12.0  12.0  12.0     27
SB    0     0     0      0   0  0  0      0.0   0.0   0.0      0

TOTAL VOLUME =  1308

TRAFFIC & ROADWAY CONDITIONS
                    ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N      0     0  .910  450   N    11.0     3
WB  0.0%  2.0%    N      0     0  .910 1000   N    11.0     3
NB  0.0%  2.0%    N      0     0  .910  850   N     8.8     3
SB  0.0%  0.0%           0     0  .000    0          8.8     0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 24.9   5    A
 2              *  *                             *  13.3   5    A
 3     *  *        *                 *           *   6.8   5    A

CYCLE= 60.0  LOST=15.0  SUM V/S CRIT= 0.39 TOTAL V/C= 0.53

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  T     1800 0.53 * 0.11  60.0  19.05  203    0.74 0.85   16.82  C   1.6     6
EB  R     1800 0.04   0.11  60.0  17.98   90    0.00 0.85   15.28  C   0.0     1
WB  L     1800 0.53 * 0.22  60.0  15.65  374    0.40 1.00   16.05  C   2.6     9
WB  T     1800 0.41   0.42  60.0   9.30  745    0.00 0.85    7.91  B   2.9    10
NB  L     1800 0.45   0.42  60.0   9.60  703    0.00 1.00    9.60  B   3.1    10
NB  T     1800 0.53 * 0.42  60.0   9.97  740    0.20 0.85    8.65  B   3.8    12
NB  R     1800 0.43   0.42  60.0   9.51  277    0.00 0.85    8.08  B   1.2     4

DIR Delay LOS
EB  16.77  C
WB  11.11  B
NB   8.94  B
INTERSECTION DELAY = 10.29 INTERSECTION LOS=B
```

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1985  HCM  -  CHAPTER  9:  SIGNALIZED
SUMMER ST/LINCOLN ST/BEDFORD ST
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=SULIPMNB   GEOMETRICS=SUMMLINC   SIGNAL=SUMMLINC
LOCATED IN CBD:N
VOLUME  &  GEOMETRICS
             VOLUMES       # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT  TOTAL  LT TH RT      LT    TH    RT    WALK
EB    0   162    5    167    0  1  1     0.0  12.0  12.0    36
WB  211   200    0    411    1  1  0    12.0  12.0   0.0    33
NB   58   243  143    444    1  1  1    12.0  12.0  12.0    27
SB    0     0    0      0    0  0  0     0.0   0.0   0.0     0

TOTAL VOLUME =  1022

TRAFFIC  &  ROADWAY  CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME  TYPE
EB   0.0%  2.0%  N      0     0   .920  450   N     11.0     3
WB   0.0%  2.0%  N      0     0   .920 1000   N     11.0     3
NB   0.0%  2.0%  N      0     0   .920  650   N      8.8     3
SB   0.0%  0.0%         0     0   .000    0          8.8     0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                22.5   5    A
 2              *  *                             * 13.0   5    A
 3     *  *        *              *              *  9.5   5    A

CYCLE= 60.0  LOST=15.0  SUM V/S CRIT= 0.47 TOTAL V/C= 0.62

LEVEL  OF  SERVICE  WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1     c       d2   PF    Delay LOS Avg Q  95%

EB  T     1800 0.62 * 0.16  60.0  17.92  282    3.14 0.85   17.90  C   2.5     8
EB  R     1800 0.04   0.16  60.0  16.26  126    0.00 0.85   13.82  B   0.1     1
WB  L     1800 0.62 * 0.22  60.0  16.16  368    2.42 1.00   18.58  C   3.0    10
WB  T     1800 0.27   0.46  60.0   7.60  818    0.00 0.85    6.46  B   2.0     7
NB  L     1800 0.10   0.37  60.0   9.27  634    0.00 1.00    9.27  B   0.7     3
NB  T     1800 0.40   0.37  60.0  10.48  667    0.00 0.85    6.91  B   2.8     9
NB  R     1800 0.62 * 0.37  60.0  11.64  249    3.54 0.85   12.91  B   1.6     6

DIR Delay LOS
EB  17.77  C
WB  12.68  B
NB  10.25  B
INTERSECTION DELAY = 12.45 INTERSECTION LOS=B
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED
ESSEX STREET/HARRISON AVE EXTENSION  AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJE

LAST DATASETS LOADED OR SAVED
VOLUME=ESHABDAM   GEOMETRICS=ESSXHARR
KEY:   D
       !
    A-  -B
       !
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP FROM D: STOP FROM D RT LANE: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

MINOR STREET LANES
                                         APPROACH: C:    D:
                           EXCLUSIVE LEFT TURN LANES: NO   YES
                          EXCLUSIVE RIGHT TURN LANES: NO   YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO   NO
             RIGHT TURN ACCELERATION LANE ON MAJOR: NO   NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
LEFTS             0.00           0.00          ·0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00

VOLUMES
APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0  977  171    0    0    0    0    0    0   52  151    0
PHF               1.00           1.00           1.00           1.00
ADJ VOLUME        0  977  171    0    0    0    0    0    0   52  151    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0              0    0    0   57  166    0

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE


LT FROM D:                 57        180      123     D      29.36          0.47
TH FROM D:                166        219       53     E      68.37          3.15
```

```
SASAKI ASSOCIATES INC.   USING CINCH (VER 2.1) BY SASAKI ASSOCIATES, INC.              10-12-1989 15:23:39
PROJECT NAME: COMMONWEALTH CENTER FEIR  PROJECT NUMBER: 8750.03  BY: SHR

1985 HCM - CHAPTER 10: UNSIGNALIZED
ESSEX/HARRISON AVE EXTENSION  PM PEAK HOUR  1996 BUILD  PROPOSED PROJECT

LAST DATASETS LOADED OR SAVED
VOLUME=ESHABDPM   GEOMETRICS=ESSXHARR
KEY:   D
       |
    A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP FROM D: STOP FROM D RT LANE: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

MINOR STREET LANES
                                             APPROACH: C:    D:
                              EXCLUSIVE LEFT TURN LANES: NO   YES
                             EXCLUSIVE RIGHT TURN LANES: NO   YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO   NO
                    RIGHT TURN ACCELERATION LANE ON MAJOR: NO   NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH         A: ESSEX EB     B: ESSEX WB     C: HARRISON NB D: HARRISON SB
LEFTS             0.00            0.00            0.00            0.00
THRUS             0.00            0.00            0.00            0.00
RIGHTS            0.00            0.00            0.00            0.00

VOLUMES
APPROACH         A: ESSEX EB     B: ESSEX WB     C: HARRISON NB D: HARRISON SB
                  LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0 1806  224    0    0    0    0    0    0  436  234    0
PHF               1.00           1.00           1.00            1.00
ADJ VOLUME        0 1806  224    0    0    0    0    0    0  436  234    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0              0    0    0  480  257    0

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                 DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE


LT FROM D:                 480         26      -454      F   INFINITE     INFINITE
TH FROM D:                 257         35      -223      F   INFINITE     INFINITE
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1985 HCM - CHAPTER 9: SIGNALIZED
TREMONT STREET/BOYLSTON STREET
AM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT  WITH MITIGATION
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=TREOBDAM   GEOMETRICS=TREMBMIT   SIGNAL=TREMBOYL
LOCATED IN CBD:N
VOLUME & GEOMETRICS
              VOLUMES          # OF LANES       LANE WIDTH       CROSS
DIR  LT   TH    RT   TOTAL   LT  TH  RT        LT    TH    RT     WALK
EB    0 1001   213   1214     0   2   1       0.0  12.0  12.0      48
WB    0    0     0      0     0   0   0       0.0   0.0   0.0       0
NB    0    0     0      0     0   0   0       0.0   0.0   0.0       0
SB  731  844   496   2071     1   2   1      12.0  12.0  12.0      48

TOTAL VOLUME =  3285

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK               PEDESTRIANS         ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME  TYPE
EB   0.0%  3.0%   N     2     0   .900   50    Y    19.0     3
WB   0.0%  0.0%         0     0   .000    0    Y    19.0     0
NB   0.0%  0.0%         0     0   .000    0    Y    14.0     0
SB   0.0%  8.0%   N     0     0   .900   50    Y    14.0     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *                                   *  *  39.2   5    A
 2                                      *  *  *     58.8   5    A
 3           *           *           *           *   0.0  12    A

CYCLE=120.0  LOST=22.0  SUM V/S CRIT= 0.82 TOTAL V/C= 1.01

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C      d1    c      d2    PF     Delay LOS Avg Q  95%

EB  T      1800 1.01 * 0.33 120.0  30.83 1158   21.94 0.85    44.85  E   30.5   92
EB  R      1800 0.48   0.33 120.0  24.53  492    0.00 0.85    20.85  C    5.3   17
SB  L      1800 1.01 * 0.49 120.0  23.44  806   26.01 1.00    49.44  E   21.4   65
SB  T      1800 0.58   0.49 120.0  16.57 1696    0.31 0.85    14.35  B   15.9   49
SB  R      1800 0.44   0.86 120.0   1.46 1263    0.00 0.85     1.24  A    2.6    9

DIR Delay LOS
EB  40.80  E
SB  23.41  C
INTERSECTION DELAY = 29.92 INTERSECTION LOS=D
```

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1985 HCM - CHAPTER 9: SIGNALIZED
TREMONT STREET/BOYLSTON STREET
PM PEAK HOUR  1996 BUILD CONDITIONS  PROPOSED PROJECT  WITH MITIGATION
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=TRBOBDPM   GEOMETRICS=TREMBMIT   SIGNAL=TREMBOYL
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES         # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT  TOTAL  LT TH RT      LT    TH    RT     WALK
EB     0   905   263  1168    0  2  1     0.0 12.0 12.0      48
WB     0     0     0     0    0  0  0     0.0  0.0  0.0       0
NB     0     0     0     0    0  0  0     0.0  0.0  0.0       0
SB   547  1775   893  3215    0  3  1     0.0 12.0 12.0      48

TOTAL VOLUME =  4383

TRAFFIC & ROADWAY CONDITIONS
                   ADJ PARK                PEDESTRIANS          ARR
DIR GRADE  %HV   Y/N MOVES BUSES   PHF CROSS BUT MIN TIME  TYPE
EB   0.0%  3.0%   N      2     0   .900   50   Y     19.0     3
WB   0.0%  0.0%          0     0   .000    0   Y     19.0     0
NB   0.0%  0.0%          0     0   .000    0   Y     14.0     0
SB   0.0%  8.0%   N      0     0   .900   50   Y     14.0     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *                                    *  *  34.6   5    A
 2                                      *  *  *      63.4   5    A
 3           *           *           *           *    0.0  12    A

CYCLE=120.0  LOST=22.0  SUM V/S CRIT= 0.84 TOTAL V/C= 1.03

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C      d1     c        d2   PF    Delay LOS Avg Q  95%

EB  T      1800 1.03 * 0.29 120.0  32.92 1021    28.97 0.85   52.61  E  31.0   94
EB  R      1800 0.67   0.29 120.0  28.68  434     3.29 0.85   27.17  D   6.9   22
SB  L-T    1800 1.03 * 0.53 120.0  22.34 2745    20.69 0.85   36.58  D  54.3  164
SB  R      1800 0.79   0.86 120.0   2.81 1263     2.82 0.85    4.78  A   4.7   15

DIR Delay LOS
EB  47.09  E
SB  28.34  D
INTERSECTION DELAY = 33.22 INTERSECTION LOS=D
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/HARRISON AVE EXT  SIGNALIZED MITIGATION
AM PEAK HOUR  1996 BUILD CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=              GEOMETRICS=            SIGNAL=
LOCATED IN CBD:N
VOLUME & GEOMETRICS
              VOLUMES         # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT  TOTAL   LT TH RT       LT    TH    RT     WALK
EB    0  977  171   1148    0  2  1      0.0  12.0  12.0      30
WB    0    0    0      0    0  0  0      0.0   0.0   0.0       0
NB    0    0    0      0    0  0  0      0.0   0.0   0.0       0
SB   52  151    0    203    1  1  0     12.0  12.0   0.0      30

TOTAL VOLUME =  1351

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS          ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME TYPE
EB   0.0%  3.0%   Y     5     0   .900   50    N      9.5     4
WB   0.0%  0.0%         0     0   .000    0           9.5     0
NB   0.0%  0.0%         0     0   .000    0           9.5     0
SB   0.0%  3.0%   Y     3     0   .900   35    N      9.5     3

PHASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
   l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
1     *  *                          *           *  37.5   5    A
2           *           *              *  *        12.5   5    A

CYCLE= 60.0  LOST=10.0  SUM V/S CRIT= 0.43 TOTAL V/C= 0.51

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  T      1800 0.51 * 0.63  60.0   4.72 2218   0.04 0.62    2.95  A    6.8    21
EB  R      1800 0.23   0.63  60.0   3.74  824   0.00 0.62    2.32  A    1.2     4
SB  L      1800 0.16   0.21  60.0  14.81  351   0.00 1.00   14.81  B    0.8     3
SB  T      1800 0.51 * 0.21  60.0  16.01  326   0.24 0.85   13.82  B    2.2     8

DIR Delay LOS
EB   2.86  A
SB  14.07  B
INTERSECTION DELAY =  4.48 INTERSECTION LOS=A
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/HARRISON AVE EXT  SIGNALIZED MITIGATION
PM PEAK HOUR  1996 BUILD CONDITIONS
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=            GEOMETRICS=           SIGNAL=
LOCATED IN CBD:N
VOLUME & GEOMETRICS
              VOLUMES         # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT  TOTAL   LT TH RT        LT   TH   RT      WALK
EB    0 1806  224  2030     0  2  1       0.0 12.0 12.0       30
WB    0    0    0     0     0  0  0       0.0  0.0  0.0        0
NB    0    0    0     0     0  0  0       0.0  0.0  0.0        0
SB  436  234    0   670     1  1  0      12.0 12.0  0.0       30

TOTAL VOLUME =  2700

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK              PEDESTRIANS         ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%   Y     5     0   .900   50   N       9.5    4
WB  0.0%  0.0%         0     0   .000    0           9.5    0
NB  0.0%  0.0%         0     0   .000    0           9.5    0
SB  0.0%  3.0%   Y     3     0   .900   35   N       9.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     +  +                          +           +  60.5   5    A
 2           +           *              +  +        29.4   5    A

CYCLE=100.0  LOST=10.0  SUM V/S CRIT= 0.83 TOTAL V/C= 0.98

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  T     1800 0.98 + 0.61 100.0  14.50 2151   11.50 0.77   20.10  C  25.5
EB  R     1800 0.31   0.61 100.0   7.26  799    0.00 0.62    4.50  A   2.7
SB  L     1800 0.98 + 0.29 100.0  26.62  495   27.14 1.00   53.76  E  14.2
SB  T     1800 0.56   0.29 100.0  22.73  461    0.89 0.85   20.07  C   5.1

DIR Delay LOS
EB  18.45  C
SB  42.00  E
INTERSECTION DELAY = 24.11 INTERSECTION LOS=C
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/SURFACE ARTERY/LINCOLN STREET
AM PEAK HOUR  1996 BUILD CONDITION  WITH MITIGATION
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=ESSUBDAM   GEOMETRICS=ESSUMITG   SIGNAL=ESSUMIT
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES      # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT   TOTAL  LT  TH  RT      LT    TH    RT     WALK
EB  778    36     0    814    2   1   0    12.0  12.0   0.0     36
WB   85   795    14    894    0   4   0     0.0  12.0   0.0     32
NB    0   491    16    507    0   2   0     0.0  12.0   0.0     75
SB    0   607     0    607    0   4   0     0.0  12.0   0.0     75

TOTAL VOLUME =   2822

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS         ARR
DIR GRADE  %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME  TYPE
EB   0.0%  3.0%   Y     1     0   .900   50    Y    16.0     3
WB   0.0%  3.0%   Y     1     0   .900   50    Y    16.0     3
NB   0.0%  3.0%   N     0     0   .900   50    Y    25.8     3
SB   0.0%  3.0%   N     0     0   .900   50    Y    25.8     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                                            27.6    5    A
 2              *  *  *                             15.7    5    A
 3                             *  *        *  *     16.6    5    A
 4           *           *           *           *   0.0   10    A

CYCLE= 85.0  LOST=25.0  SUM V/S CRIT= 0.60 TOTAL V/C= 0.86

LEVEL OF SERVICE WORKSHEET
DIR L GRP   SAT  v/c CM g/C     C     d1     c      d2   PF    Delay LOS Avg Q  95%

EB  L      1800 0.86 * 0.32  85.0  20.39 1060    5.79 1.00   26.18  D   15.1
EB  T      1800 0.08   0.32  85.0  15.10  516    0.00 0.85   12.84  B    0.6
WB  L-T-R  1800 0.86 * 0.19  85.0  25.48 1276    4.89 0.85   25.81  D   19.1
NB  T-R    1800 0.86 * 0.20  85.0  25.10  691    8.47 0.85   28.53  D   11.2
SB  T      1800 0.53   0.20  85.0  23.33 1388    0.15 0.85   19.96  C   12.8

DIR Delay LOS
EB  25.62  D
WB  25.81  D
NB  28.53  D
SB  19.96  C
INTERSECTION DELAY = 24.95 INTERSECTION LOS=C
```

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SASAKI ASSOCIATES INC   USING CINCH (VER 2.1) BY SASAKI ASSOCIATES, INC.              10-25-1989  11:05:33
PROJECT NAME: COMMONWEALTH CENTER FEIR  PROJECT NUMBER: 8570.03  BY: SHR

1985 HCM - CHAPTER 9: SIGNALIZED
ESSEX STREET/SURFACE ARTERY/LINCOLN STREET
PM PEAK HOUR  1996 BUILD CONDITIONS  WITH MITIGATION
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=ESSUBDPM   GEOMETRICS=ESSUMITG   SIGNAL=ESSUMIT
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT      LT   TH   RT    WALK
EB 1112   90    0  1202    2  1  0    12.0 12.0  0.0    36
WB   73  448   13   534    0  4  0     0.0 12.0  0.0    32
NB    0  804   15   819    0  2  0     0.0 12.0  0.0    75
SB    0 1356  161  1517    0  4  0     0.0 12.0  0.0    75

TOTAL VOLUME =  4072

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  3.0%   Y     1    0   .900   50   Y    16.0    3
WB  0.0%  3.0%   Y     1    0   .900   50   Y    16.0    3
NB  0.0%  3.0%   N     0    0   .900   50   Y    25.8    3
SB  0.0%  3.0%   N     0    0   .900   50   Y    25.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                                            49.5   5    A
 2              *  *  *                             11.8   5    A
 3                             *  *        *  *     33.7   5    A
 4           *           *           *           *   0.0  10    A

CYCLE=120.0  LOST=25.0  SUM V/S CRIT= 0.76 TOTAL V/C= 0.96

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C      d1    c      d2   PF   Delay LOS Avg Q  95%

EB  L      1800 0.96 * 0.41 120.0  26.10 1347  12.87 1.00  38.97  D  29.5   89
EB  T      1800 0.15   0.41 120.0  16.78  655   0.00 0.85  14.27  B   2.0    7
WB  L-T-R  1800 0.96 * 0.10 120.0  40.95  678  20.01 0.85  51.81  E  20.0   61
NB  T-R    1800 0.96 * 0.28 120.0  32.35  992  15.72 0.85  40.86  E  24.3   74
SB  T-R    1800 0.95   0.28 120.0  32.15 1958   8.24 0.85  34.33  D  41.1  124

DIR Delay LOS
EB  37.21  D
WB  51.81  E
NB  40.86  E
SB  34.33  D
INTERSECTION DELAY = 38.79 INTERSECTION LOS=D
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
KNEELAND STREET/SURFACE ARTERY
AM PEAK HOUR  1996 BUILD  PROPOSED PROJECT  SURFACE ARTERY ONE-WAY SB
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KNSABDAM   GEOMETRICS=KNEESMIT   SIGNAL=KNEESURF
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT  TOTAL  LT TH RT      LT   TH   RT     WALK
EB     0  536  179   715   0  2  1     0.0 12.0 12.0    50
WB    51  645    0   696   1  2  0    12.0 12.0  0.0    50
NB     0    0    0     0   0  0  0     0.0  0.0  0.0     0
SB   168  551  293  1012   0  3  1     0.0 12.0 12.0    50

TOTAL VOLUME =  2423

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK            PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y     0    0   .900    0   Y    19.5    3
WB  0.0%  2.0%   Y     0    0   .900    0   Y    19.5    3
NB  0.0%  0.0%         0    0   .000    0        19.5    0
SB  0.0%  2.0%   N     0    0   .900    0   N    19.5    4

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *     *  *                                24.8   5    A
 2                                      *  *  *     25.2   5    A

CYCLE= 60.0  LOST=10.0  SUM V/S CRIT= 0.43 TOTAL V/C= 0.51

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C      C     d1    c      d2   PF    Delay LOS Avg Q  95%

EB  T     1800 0.42   0.41  60.0   9.53 1472    0.00 0.85    8.10  B   5.8   18
EB  R     1800 0.32   0.41  60.0   9.04  626    0.00 0.85    7.69  B   1.9    7
WB  L     1800 0.16   0.41  60.0   8.41  355    0.00 0.85    7.15  B   0.6    2
WB  T     1800 0.51 * 0.41  60.0   9.96 1472    0.04 0.85    8.50  B   7.0   22
SB  L-T   1800 0.39   0.42  60.0   9.17 2248    0.00 0.62    5.68  B   7.7   24
SB  R     1800 0.51 * 0.42  60.0   9.76  637    0.10 0.62    6.11  B   3.1   10

DIR Delay LOS
EB   8.00  B
WB   8.41  B
SB   5.80  B
INTERSECTION DELAY =  7.18 INTERSECTION LOS=B
```

```
1985 HCM - CHAPTER 9: SIGNALIZED
KNEELAND STREET/SURFACE ARTERY
PM PEAK HOUR  1996 BUILD  PROPOSED PROJECT  WITH SURFACE ARTERY ONE-WAY SB
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KNSABDPM   GEOMETRICS=KNEESMIT   SIGNAL=KNEESURF
LOCATED IN CBD:N
VOLUME & GEOMETRICS
             VOLUMES         # OF LANES     LANE WIDTH      CROSS
DIR  LT   TH   RT  TOTAL   LT TH RT       LT   TH   RT      WALK
EB    0  726  536  1262     0  2  1      0.0 12.0 12.0       50
WB   97  383    0   480     1  2  0     12.0 12.0  0.0       50
NB    0    0    0     0     0  0  0      0.0  0.0  0.0        0
SB  131 2132  288  2551     0  4  0      0.0 12.0  0.0       50

TOTAL VOLUME =  4293

TRAFFIC & ROADWAY CONDITIONS
                   ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    Y     0     0   .900    0   Y     19.5    3
WB  0.0%  2.0%    Y     0     0   .900    0   Y     19.5    3
NB  0.0%  0.0%          0     0   .000    0         19.5    0
SB  0.0%  2.0%    N     0     0   .900    0   N     19.5    4

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND.GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *     *  *                                32.8   5    A
 2                                      *  *  *     37.2   5    A

CYCLE= 80.0  LOST=10.0  SUM V/S CRIT= 0.84 TOTAL V/C= 0.96

LEVEL OF SERVICE WORKSHEET
DIR L GRP  SAT  v/c CM g/C     C     d1    c      d2    PF    Delay LOS Avg Q  95%

EB  T     1800 0.58    0.41  80.0  13.86 1463    0.35 0.85   12.08  B  10.6   33
EB  R     1800 0.96 *  0.41  80.0  17.41  622   20.23 0.85   32.00  D  10.8   33
WB  L     1800 0.47    0.41  80.0  13.08  230    0.00 0.85   11.12  B   1.4    5
WB  T     1800 0.31    0.41  80.0  12.08 1463    0.00 0.85   10.27  B   5.6   18
SB  L-T-R 1800 0.96 *  0.46  80.0  15.70 3255    6.41 0.77   16.94  C  34.2  103

DIR Delay LOS
EB  20.30  C
WB  10.43  B
SB  16.94  C
INTERSECTION DELAY = 17.19 INTERSECTION LOS=C
```

Wind

Analysis of Amended Design

Due to the proximity of the Commonwealth Center towers and the southern portion of the Boston Crossing project, the redesign of even one tower has a significant effect on the wind environment in the area. The following design modifications made to both the Commonwealth Center and Boston Crossing projects which affect the pedestrian-level wind environment are:

1. The slimming and re-orientation of the Keith Block tower of Commonwealth Center project;

2. The height reduction of the arcade area of Parcel 30 between the hotel and the office tower; and

3. The reduction of height and re-orientation of the southern portion of Boston Crossing.

References to "revised No-Build conditions" reflect changes to the Boston Crossing project. References to Commonwealth Center's amended design reflect the current design as described in the Urban Design Component of the FPIR/FEIR.

The slimming and re-orientation of the Keith Block tower has decreased the amount of flow from the West being directed into Avery Street and South-Southeast winds into Washington Street. The height reduction of the Parcel 30 arcade has resulted in an additional relief slot for winds directed along Washington Street and those along Tremont Street, therefore resulting in slightly lower wind speeds in the area. The re-orientation of the southern portion of Boston Crossing with respect to prevalent wind direction (northwest to southwest) has resulted in fewer high-speed winds being directed into the pedestrian level in comparison to the Boston Crossing DPIR/DEIR, but slightly stronger pedestrian winds in comparison to the Commonwealth Center DPIR and DEIR.

Qualitative Analysis of the Amended Design

The qualitative assessment of the wind conditions included the use of smoke visualization as well as erosion particle studies for key wind directions (northwest 330½ to 300½, Figures 1 and 2, the winds along Hayward Place lose some of their strength as the southern portion of the Boston Crossing project directs less flow into Washington Street and more flow over the rooftop of the proposed Lafayette Place Specialty Retail Center. Along Tremont Street, the approaching winds still seek relief "slots" in the form of cross streets. The increased normal component and decreased lateral component of the approach flow to the street wall results in stronger winds along the cross street nearest Tremont-on-the-Common.

For the west winds 270 degrees (Figure 3), the strongest pedestrian-level windspeeds are expected to occur along Avery Street, as the winds from the Boston Common and those deflected downward from the Keith Block tower are channeled along the street. At the intersection of Avery and Washington Streets, the flow splits and travels both north and south along Washington Street and east along Hayward Place. The westerly wind strikes the western face of the Parcel 30 tower, travels down the building face, then wraps around the side and into Essex Street. All other areas seem to experience moderate to light winds.

Quantitative Analysis of Amended Design

Eighteen sensor locations were retested to measure the effect of the amended design and revised No-Build Conditions. These locations were chosen after careful review of the qualitative analysis to record any significant changes in flow patterns. Figure 4 illustrates the sensor locations retested and the annual 1% gust velocities for the No-Build 1996 and Proposed Project. The shaded numbers represent those sensors in exceedance of the BRA's guideline of 31 mph. The two left-hand columns reiterate the DPIR/DEIR results and the two right-hand columns present the results based on the amended design.

Figure 5 illustrates the annual 1% mean gust velocities in the same manner. More detailed information concerning the data for the amended design and revised No-Build 1996 condition are located in this Technical Appendix. The revised No-Build 1996 conditions include the revised Boston Crossing design. For the amended design, one retested sensor locations exceed the BRA's 31 mph guideline, whereas the revised No-Build condition exceeds the guideline three times. In the DPIR/DEIR results, the guideline was exceeded once for the Proposed condition and twice for the No-Build condition for the same sensor locations.

Tremont Street, Amended Design

The same general dynamics dominate the flow field along Tremont Street, as previously described in the DPIR/DEIR. The following two sections divide the analysis of Tremont Street into areas north and south of Tremont-on-the-Common.

North of Tremont-on-the-Common to Temple Place

Qualitative analysis shows the wind conditions in this area remain virtually unchanged by the amended Proposed project and revised No-Build 1996 conditions.

South of Tremont-on-the-Common to Boylston Street

The amended designs of the Commonwealth Center project has resulted in a slightly different distribution of windspeeds along Tremont Street. For the dominate northwest winds, the slimming and re-orientation of the Keith Block tower and the lowering of the Parcel 30 arcade has resulted in less flow being deflected towards Tremont Street. As a result, the winds blowing across the Boston Common and those deflected downward by the nearby Tremont-on-the-Common escaped more easily through Mason Place than had previously occurred. The corner of Boylston Street and Tremont Street records a sharp decline during the northwest winds because more flow passes into Avery Street and over the arcade of Parcel 30. Figure 6 graphically represents the changes in the annual 1% gust velocities.

For the amended design, the BRA's 31 mph guideline has been exceeded once on the annual basis and twice on the seasonal basis, whereas the No-Build condition recorded velocities in exceedance of the guideline three times on the annual basis and three times on the seasonal basis. All areas along Tremont Street will experience the strongest winds during the winter months. For the amended design, significant decrease was recorded at the potentially hazardous corner of the Masonic Lodge. The amended design resulted in unchanged velocities along Mason Place and Avery Street. At location 5, 1% gust velocities fall from 35.1 mph annual and 33.2 mph maximum seasonal for the amended design. The windspeeds for the revised and previous No-Build 1996 conditions are slightly stronger than those of the amended design.

Boston Common, Amended Design

This area remains virtually unchanged from DPIR/DEIR results.

Washington Street, Amended Design

The revised design of the Commonwealth Center towers and Southern component of Boston Crossing has resulted in higher windspeed in some areas and lower in others. Graphical representation of the annual 1% gust velocities is shown in Figure 7. The re-orientation and slimming of the Keith Block as well as height reduction and reorientation of Boston Crossing's southern portion produces lower windspeeds in a region between Avery Street and Hayward Place. For sensor locations 18, 19, and 24, the annual 1% gust velocities measured 13.9 mph, 23.3 mph, and 23.2 mph for the amended design, whereas the previous proposed conditions recorded 1% gust velocities of 14.7 mph, 26.7 mph and 25.4 mph. The maximum seasonal 1% gust velocity ranged from 14.9 mph to 26.3 mph for the amended design with the strongest wind occurring during the winter months. For the previous proposed design, the maximum seasonal 1% gust velocity ranged from 15.7 mph to 28.4 mph also during the winter months. Significant decreases were also measured for the revised No-Build 1996 condition. In the case of the revised No-Build 1996 condition, annual 1% gust velocities measured 13.9 mph, 14.7 mph, and 23.2 mph for sensor locations 18, 19, and 24, respectively; whereas the previous No-Build condition resulted in 1% gust velocities of 14.7 mph, 26.7 mph, and 25.4 mph. On the seasonal basis, the maximum 1% gust velocity for the revised No-Build ranged from 16.4 mph to 26.2 mph, whereas the previous No-Build resulted in windspeeds from 23.7 mph to 28.4 mph. This area will remain suitable for pedestrian activities for the modified designs.

Slight increases in velocity are found from Hayward Place to Boylston Street due to stronger winds from the north-northwest and the southwest directions, in comparison to the Commonwealth Center DPIR and DEIR. The 1% annual gust velocities for locations 4 and 17 remain below the acceptable BRA guideline of 31 mph, but the winter winds produce gust velocities less than 1 mph above this annual guideline. Testing to reduce the winter winds is detailed in the mitigation section. Little change is measured for the No-Build conditions. These velocities are substantially lower than those reported in the Boston Crossing DPIR and DEIR.

From Avery Street to the Boston Opera Company, a slight increase in gust velocities occurs for the revised No-Build 1996 condition and the amended Proposed project. For sensor locations 28 and 29, the annual 1% gusts velocity increased from 21.6 mph to 21.9 mph and 20.3 mph to 24.6 mph, respectively, for the amended design. In the case of the revised No-Build 1996 design, the annual 1% gust velocity increased from 23.6 mph to 24.9 mph and from 19.0 mph to 24.3 mph for the same locations. The maximum seasonal 1% gust velocities remain within acceptable conditions for pedestrian activities. The windspeeds measured for the Boston Crossing DPIR/DEIR were slightly higher than those found with the revised testing configuration. In comparison, the modifications to the Proposed project have been beneficial to the wind climate in this area.

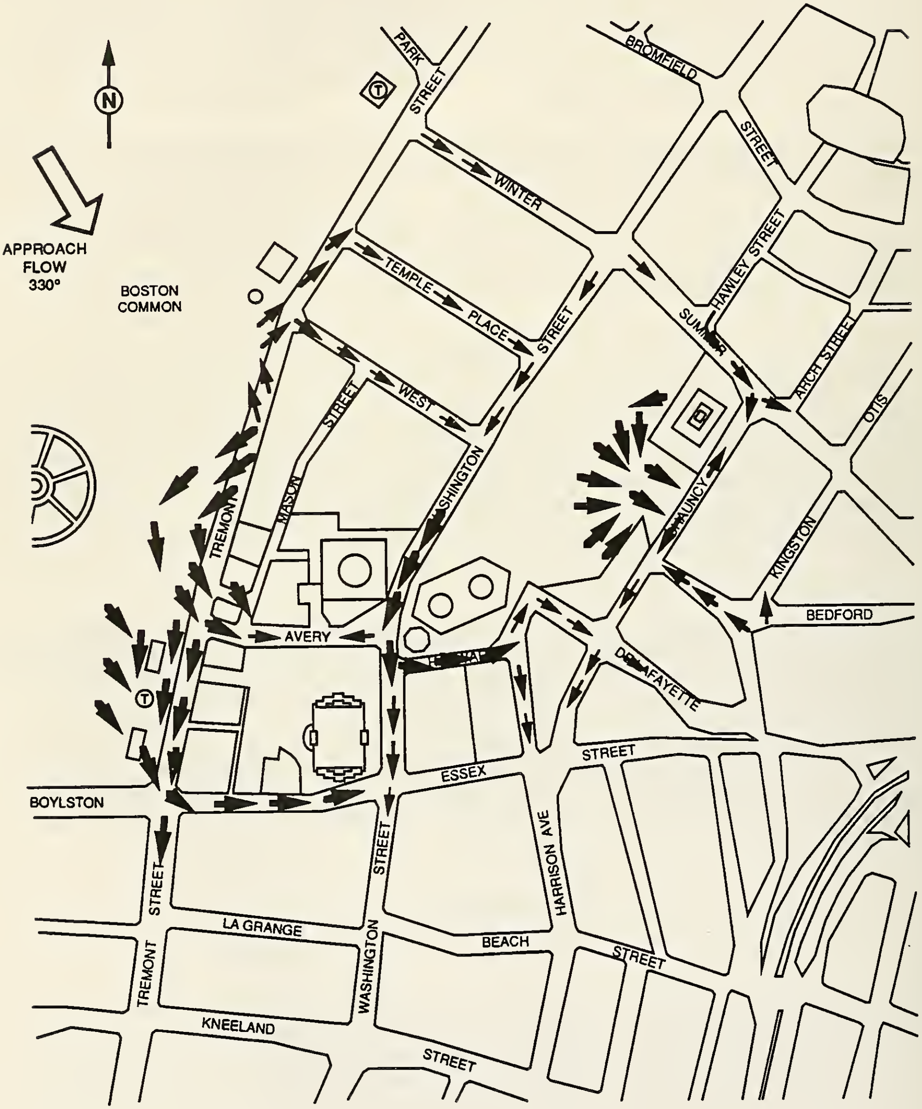
Keith Block and Parcel 30, Amended Design

The wind comfort levels around the perimeter of the amended proposed project remains virtually the same, except for three sensor locations (4, 5, and 22). Graphical representation of other annual 1% gust velocities is illustrated in Figure 8. Sensor location 4 was detailed in the Washington Street section, and sensor location 5 was detailed in the Tremont Street section of the amended design.

By slimming and re-orienting the Keith Block tower and the expanding truck loading area along Mason Street, windspeeds along Mason Street have diminished. In fact, sensor location 22 experiences over a forty percent drop in 1% gust velocity as compared to the previous proposed project. The amended Proposed project causes windspeeds along Mason Street to be within the acceptable comfort levels for pedestrian activities.

Figure 1

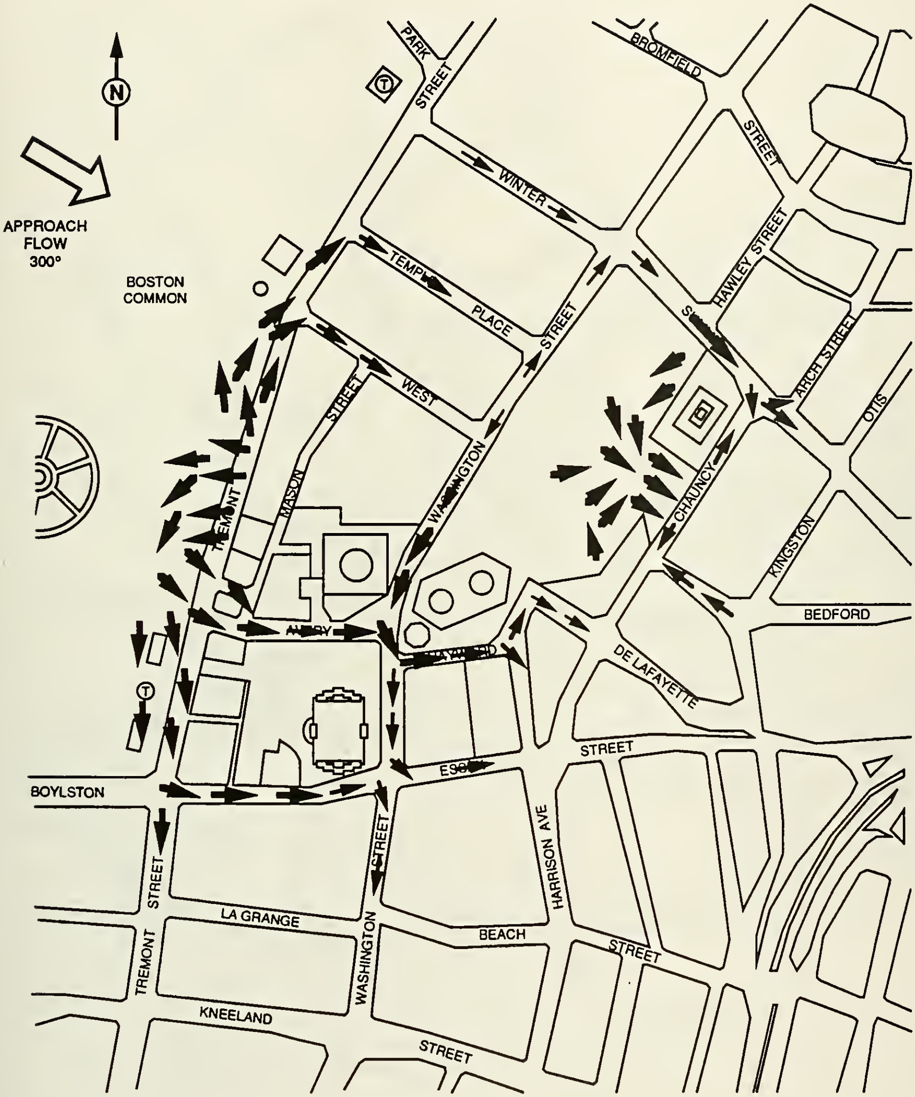
Proposed Project - Revised Design
Northwest Winds 330°



891002

Figure 2

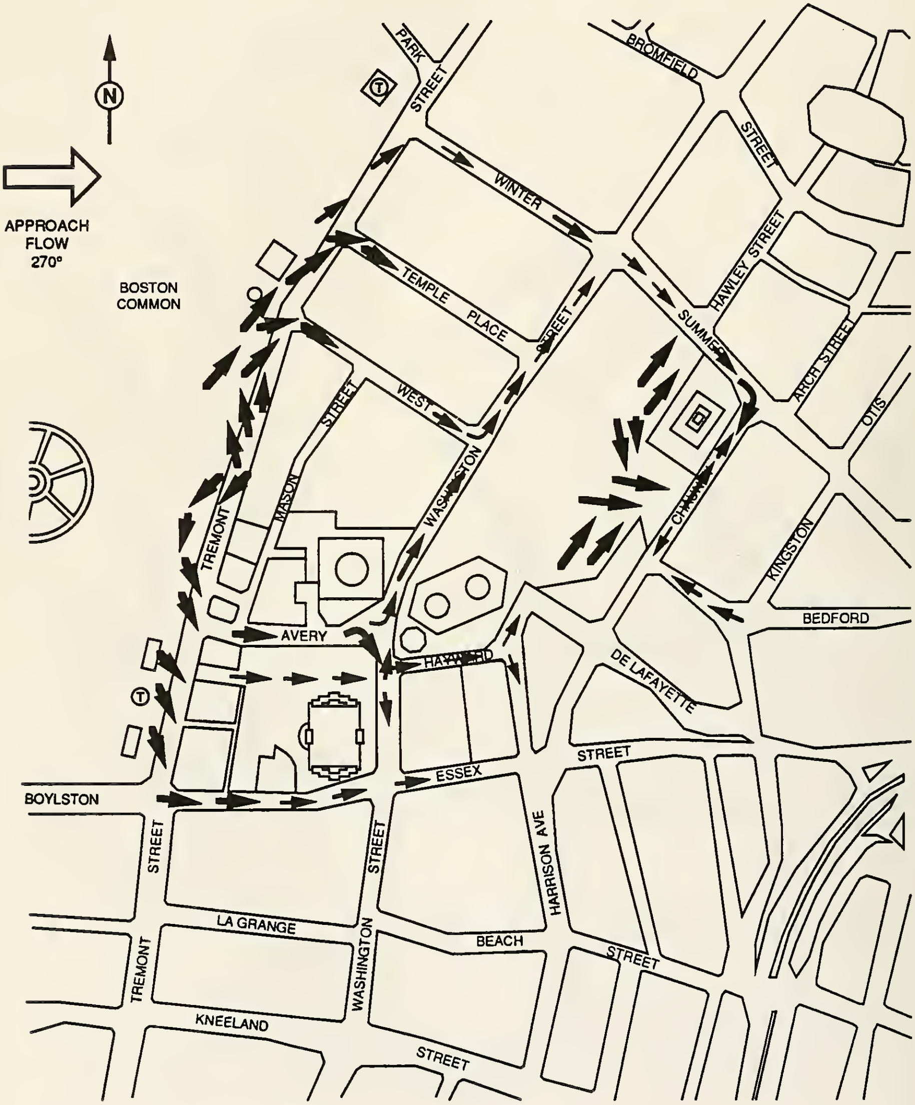
Proposed Project - Revised Design
Northwest Winds 300°



891002-02 R0

Figure 3

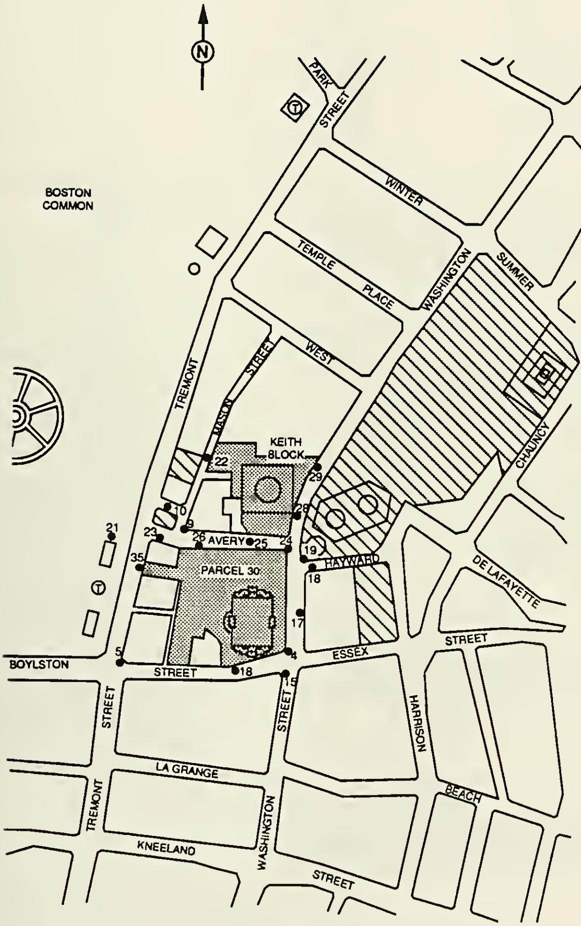
Proposed Project - Revised Design
West Winds 270°



89100

Figure 4

SENSOR LOCATIONS WITH 1% GUST VELOCITY VALUES



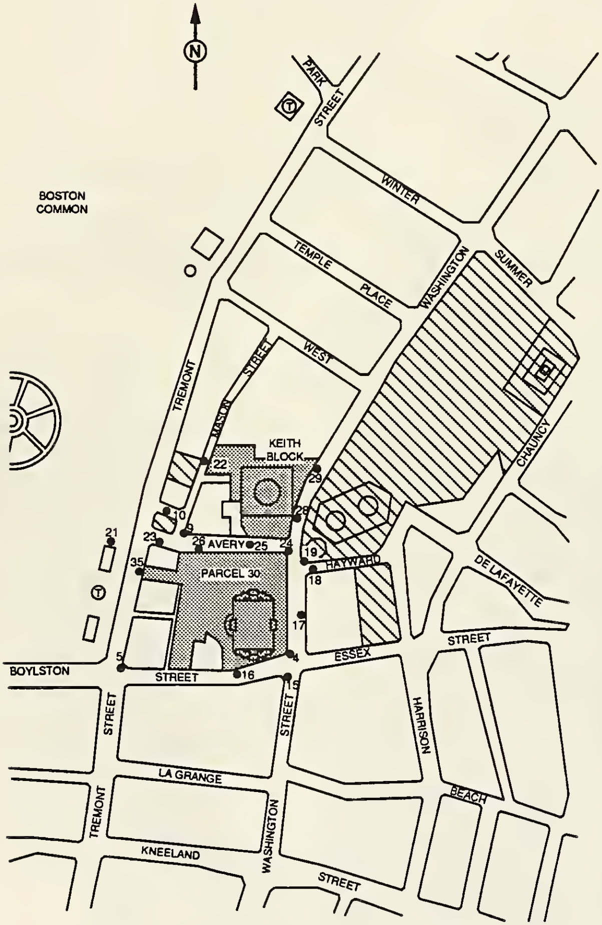
NB = No-Build Conditions as of 1996
PR = Proposed Project

Bold = Exceeds BRA criterion for acceptability limit of pedestrian of 31 mph effective gust velocity 1% of the time on an annual basis

Point #	Previous Design (mph)		Revised Design (mph)	
	NB	PR	NB	PR
4	13.5	25.2	12.1	29.8
5	**31.7**	**35.1**	**32.4**	**31.3**
9	23.2	17.0	24.4	18.5
10	**35.9**	27.5	**35.3**	**32.2**
15	14.7	18.5	13.6	20.8
16	14.5	15.8	13.5	16.5
17	20.8	27.4	21.6	29.9
18	21.7	14.7	15.4	13.9
19	26.5	26.7	24.9	23.3
21	16.4	19.7	16.2	20.8
22	14.3	23.8	13.5	13.9
23	25.0	30.3	**32.3**	29.7
24	22.3	25.4	17.7	23.2
25	23.6	27.6	27.4	25.3
26	22.5	21.3	26.7	23.4
28	23.6	21.6	24.9	21.9
29	19.0	20.3	24.3	24.6
35	28.9	26.1	27.1	24.1

Figure 5

SENSOR LOCATIONS WITH 1% MEAN VELOCITY VALUES

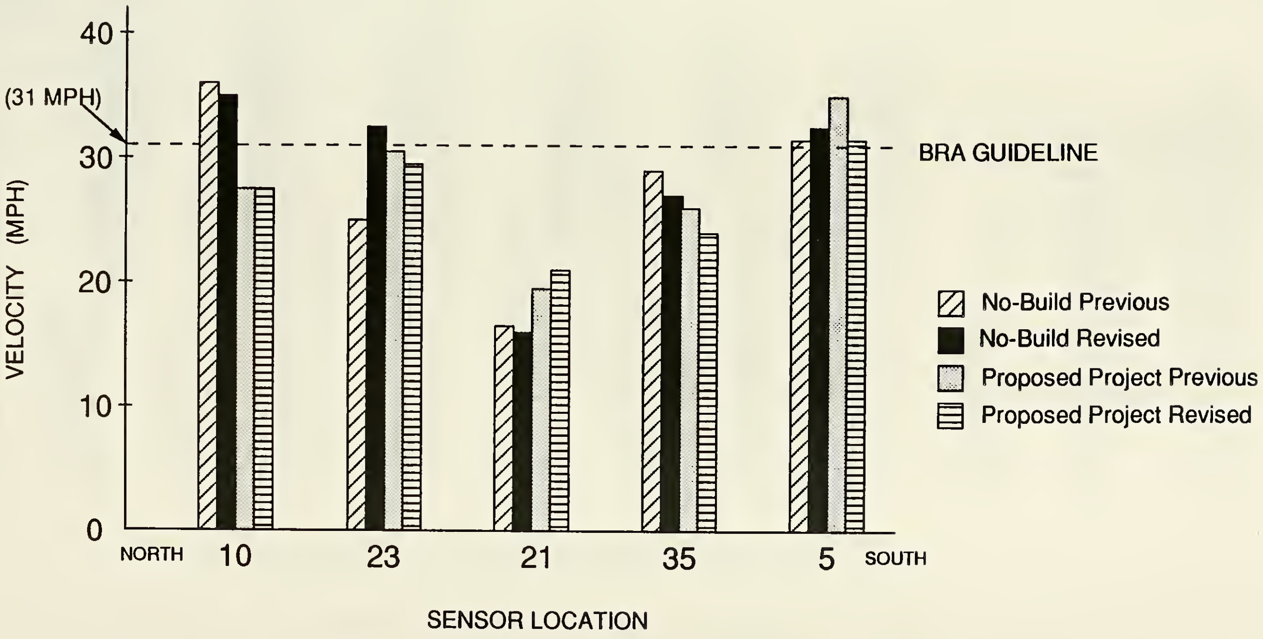


NB = No-Build Conditions as of 1996
PR = Proposed Project

Point #	Previous Design (mph)		Revised Design (mph)	
	NB	PR	NB	PR
4	7.1	18.8	6.5	22.6
5	25.2	27.3	26.5	25.1
9	13.6	10.6	14.3	11.4
10	26.1	17.7	26.2	22.4
15	8.7	12.4	8.0	14.8
16	8.5	8.7	7.9	9.6
17	14.0	18.7	16.0	22.6
18	13.1	8.9	9.6	8.6
19	19.7	19.0	19.6	16.7
21	9.9	11.9	10.6	13.6
22	8.5	16.7	7.8	8.1
23	17.0	21.1	22.7	21.1
24	14.4	17.8	11.8	17.1
25	16.8	19.6	19.9	17.4
26	13.3	13.3	19.1	14.9
28	15.7	13.7	18.4	15.8
29	12.6	13.5	17.4	17.7
35	19.4	17.5	18.8	15.9

Figure 6

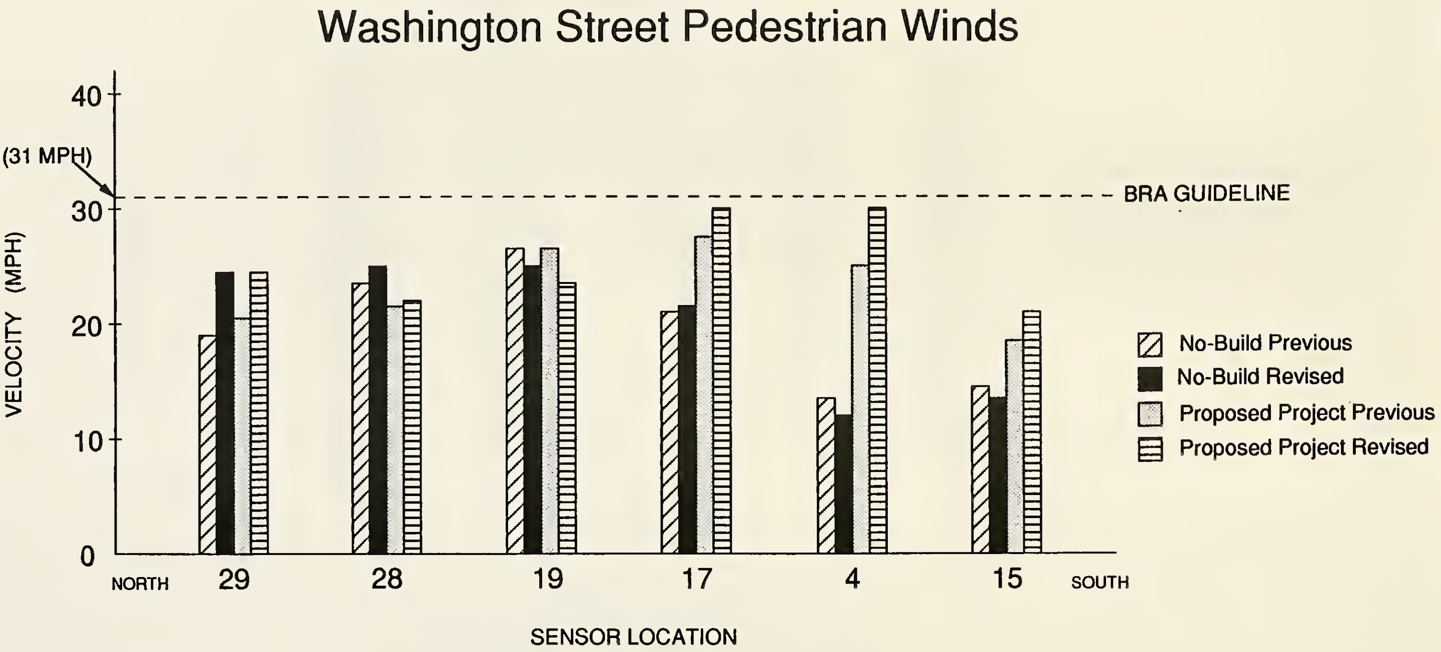
Tremont Street Pedestrian Winds



1% Annual Gust Wind Velocities Along Tremont Street

890302-02 R1

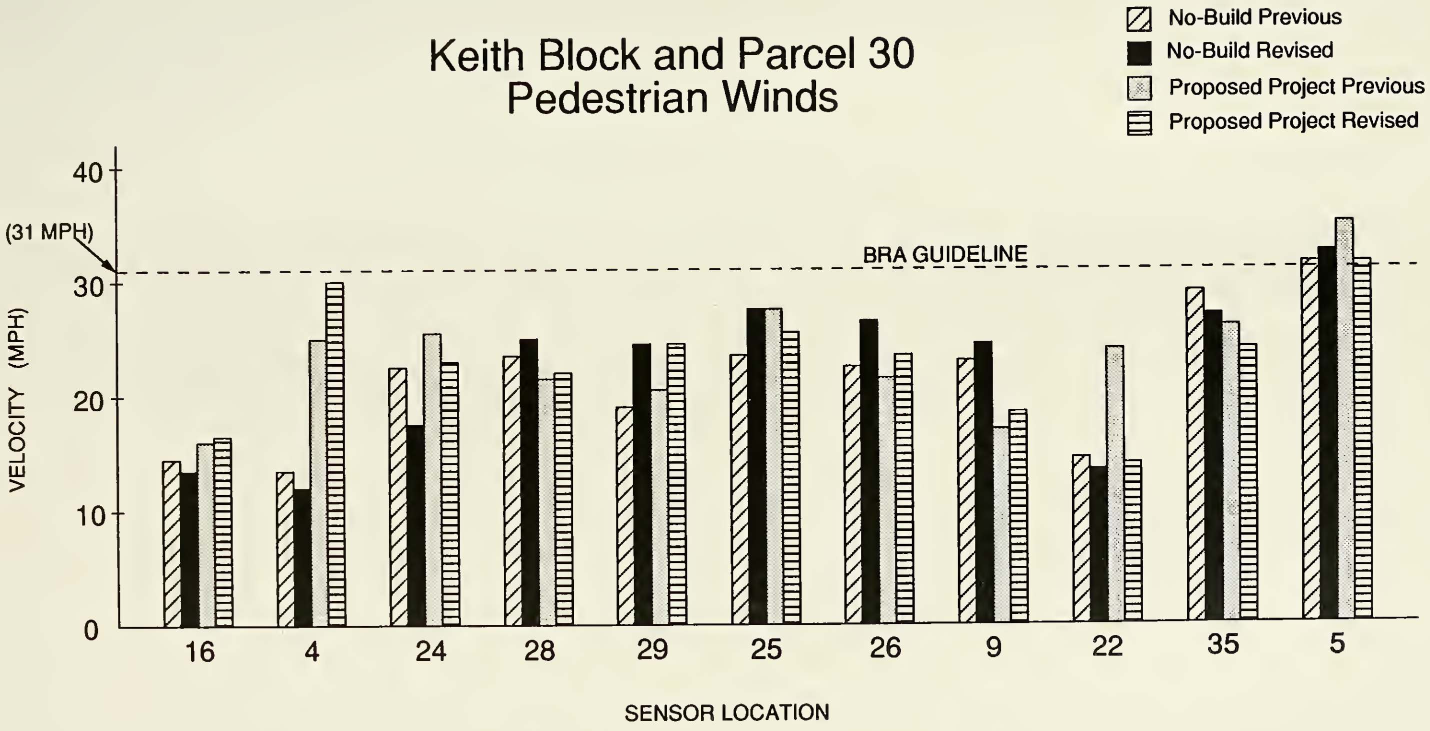
Figure 7



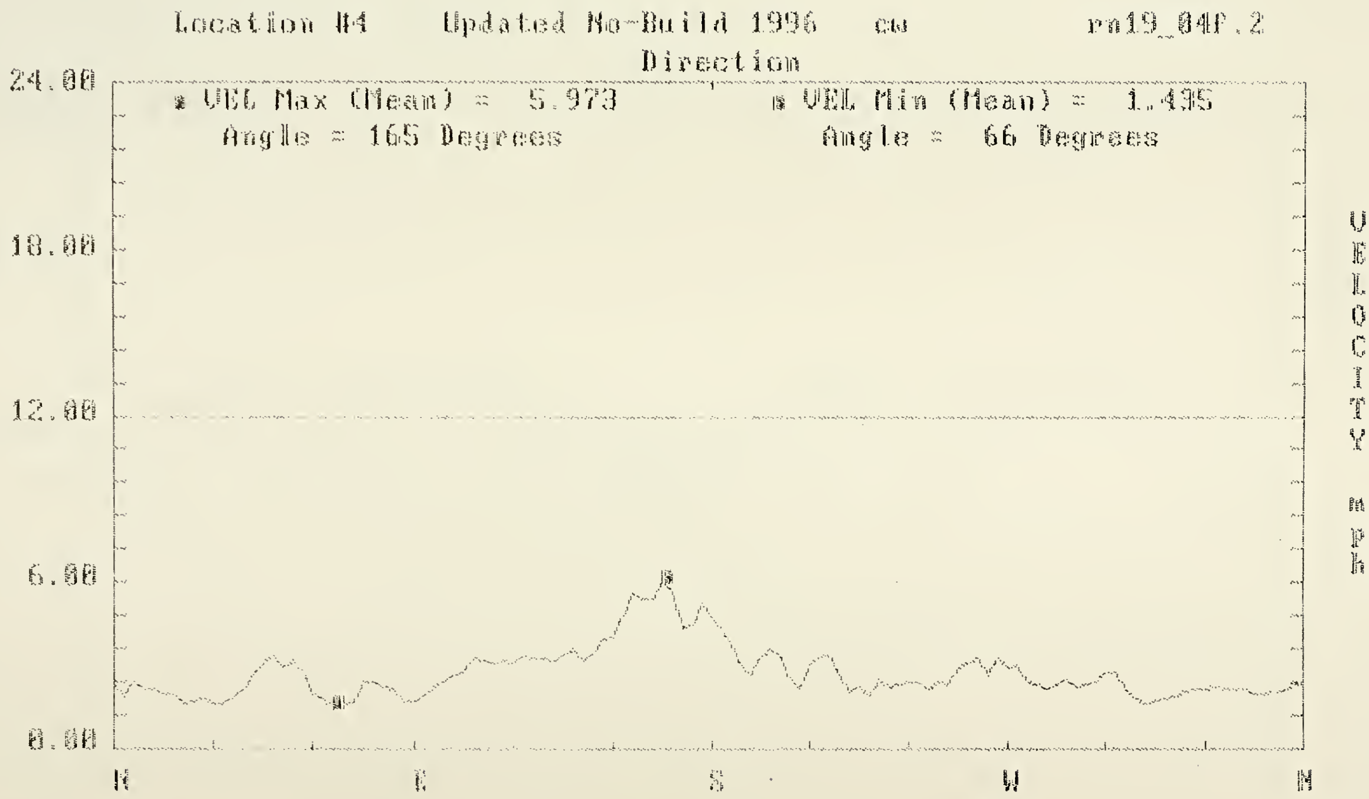
1% Annual Gust Wind Velocities Along Washington Street

Figure 8

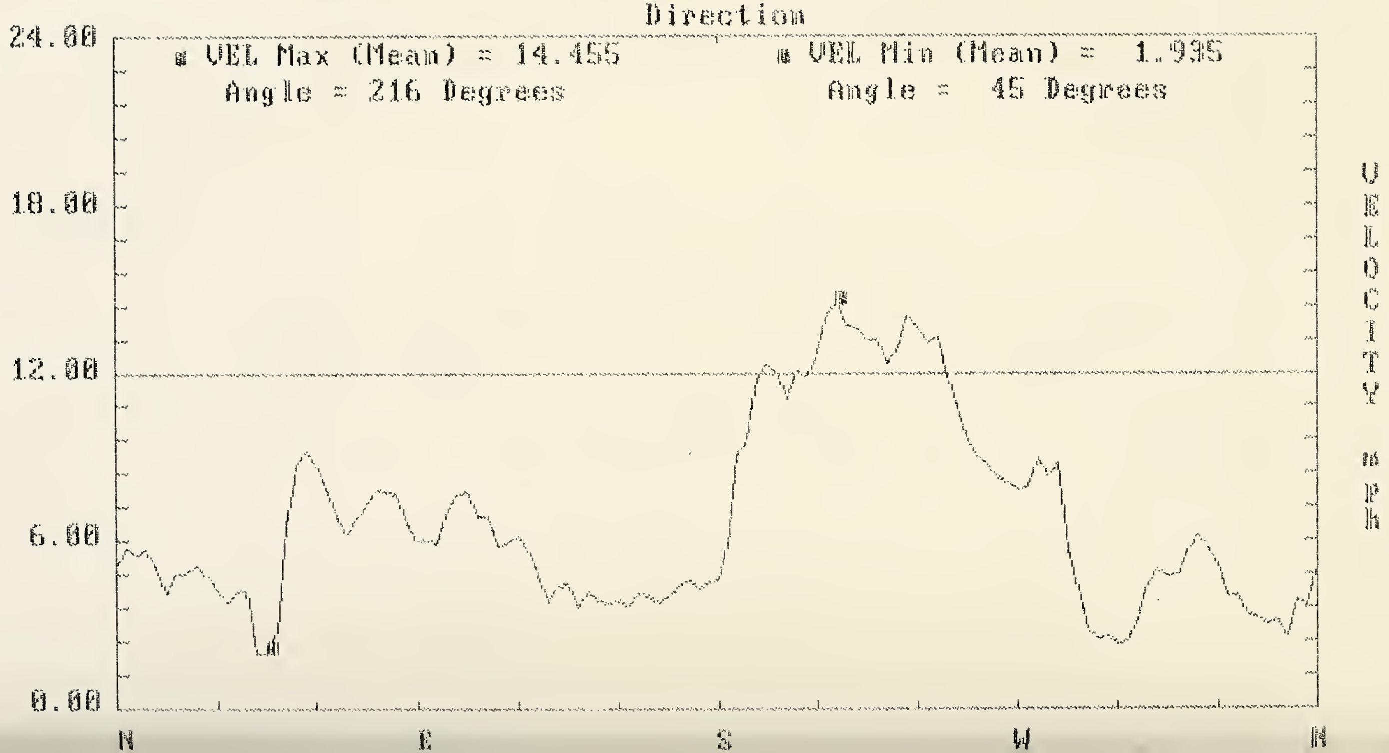
Keith Block and Parcel 30
Pedestrian Winds

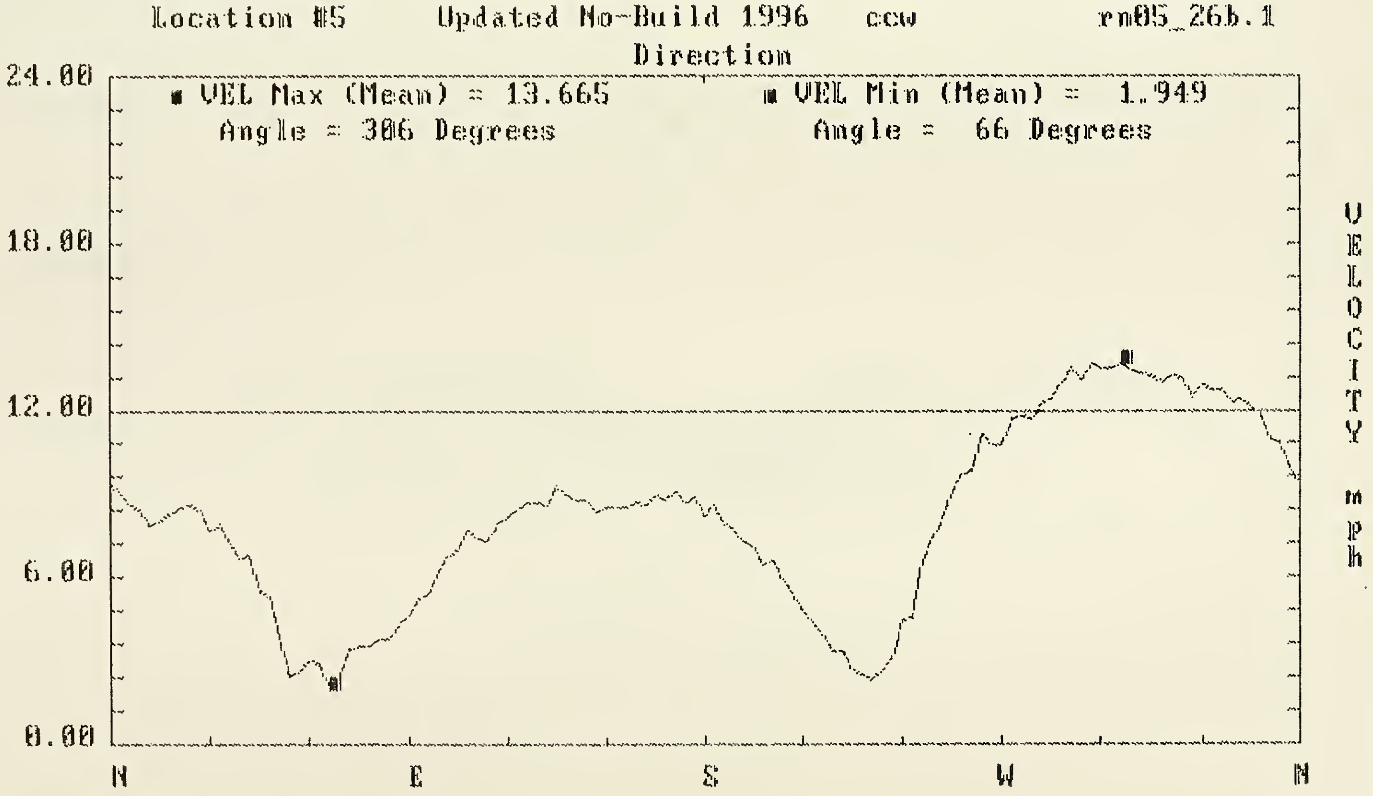


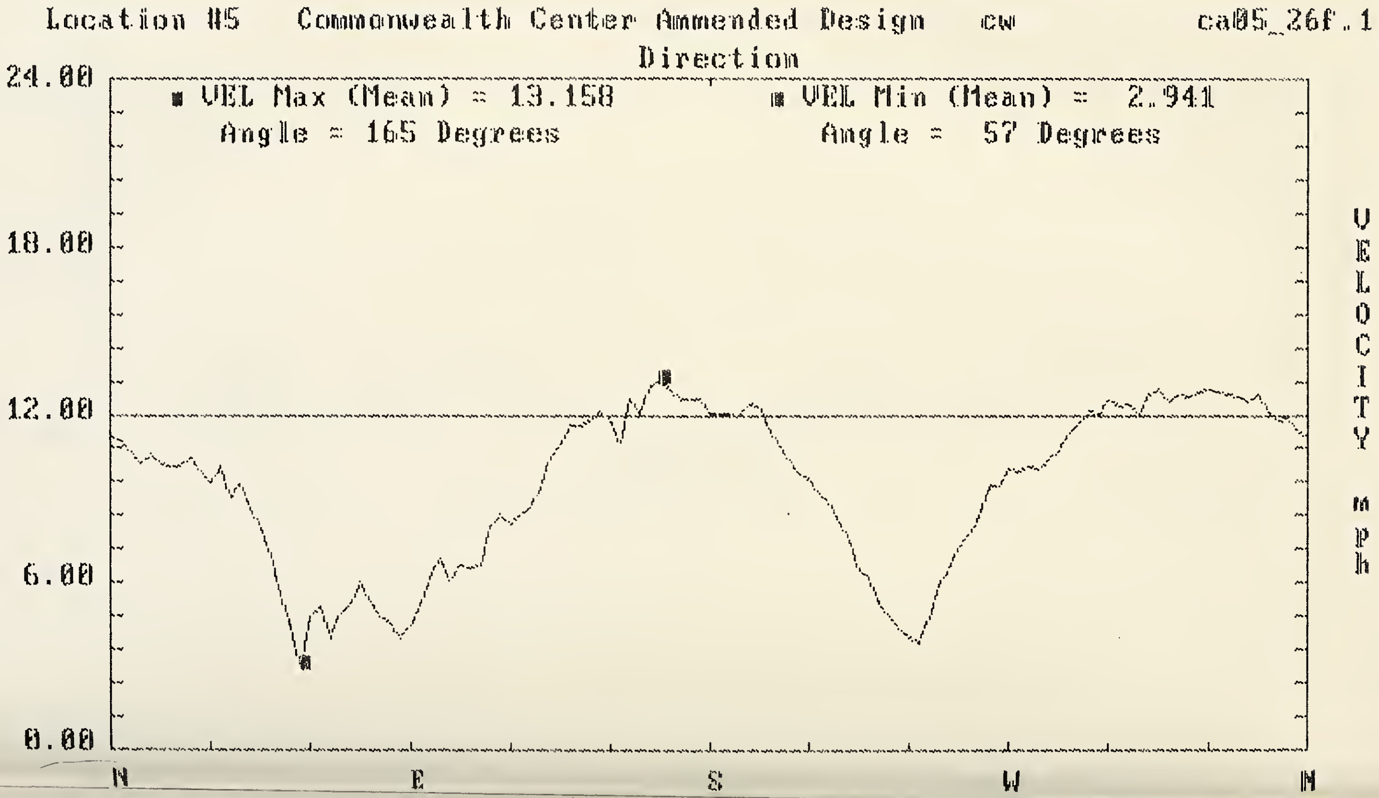
1% Annual Gust Wind Velocities at Building Entrances
on Keith Block and Parcel 30

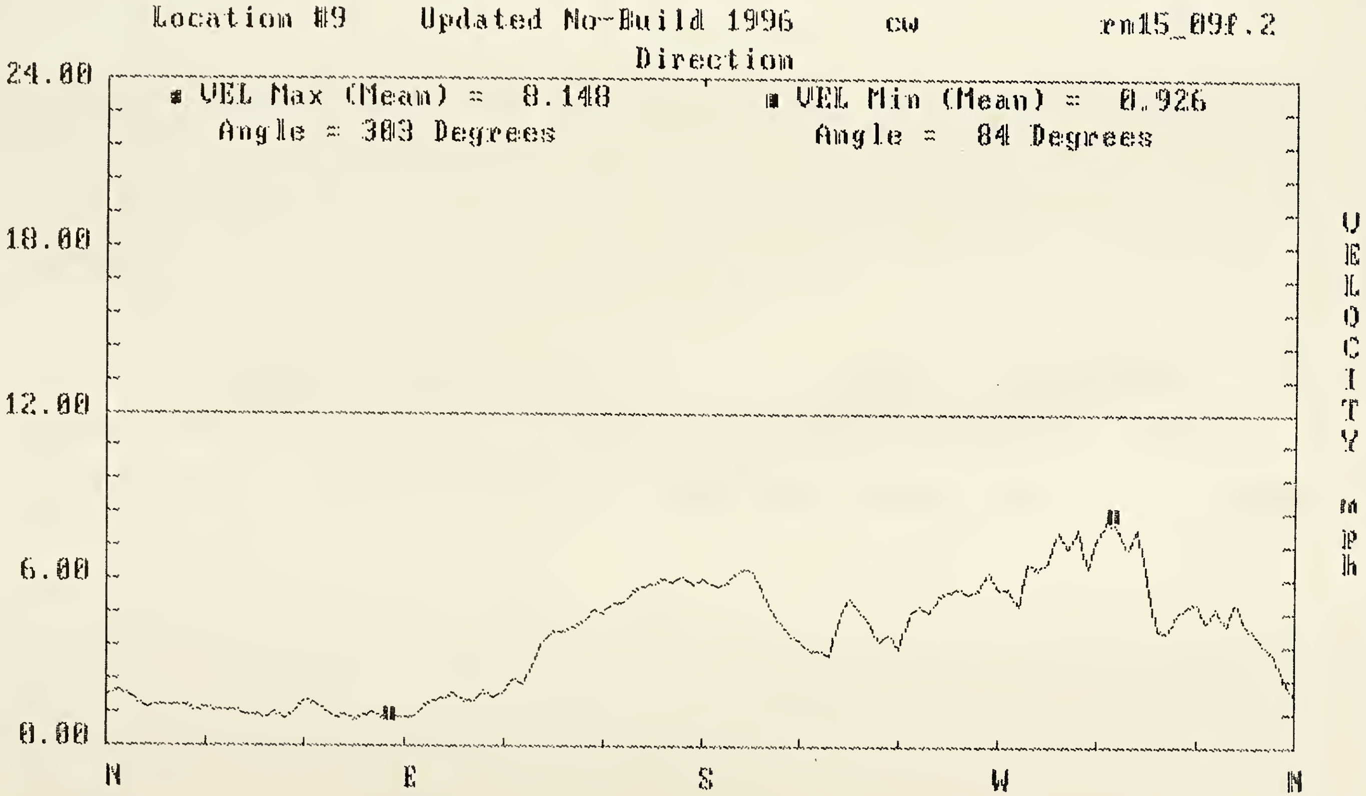

Location #4 Updated No-Build 1996 cw rn19_04F.2
Direction
* VEL Max (Mean) = 5.973
Angle = 165 Degrees
* VEL Min (Mean) = 1.435
Angle = 66 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph

Location #4 Commonwealth Center Amended Design CCW a:bc01_22b.1

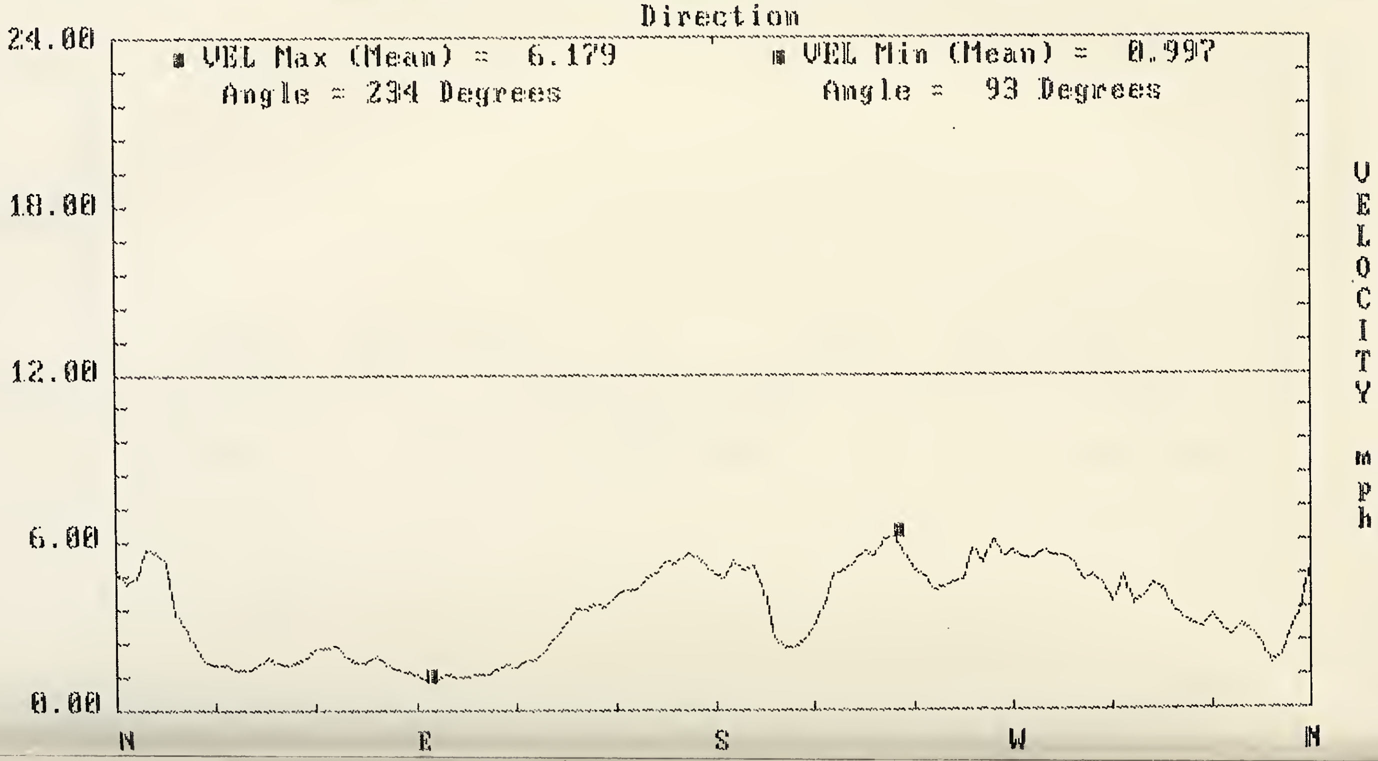



Location #5
Updated No-Build 1996
ccw
rn05_26b.1
Direction
■ VEL Max (Mean) = 13.665
Angle = 306 Degrees
■ VEL Min (Mean) = 1.949
Angle = 66 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph

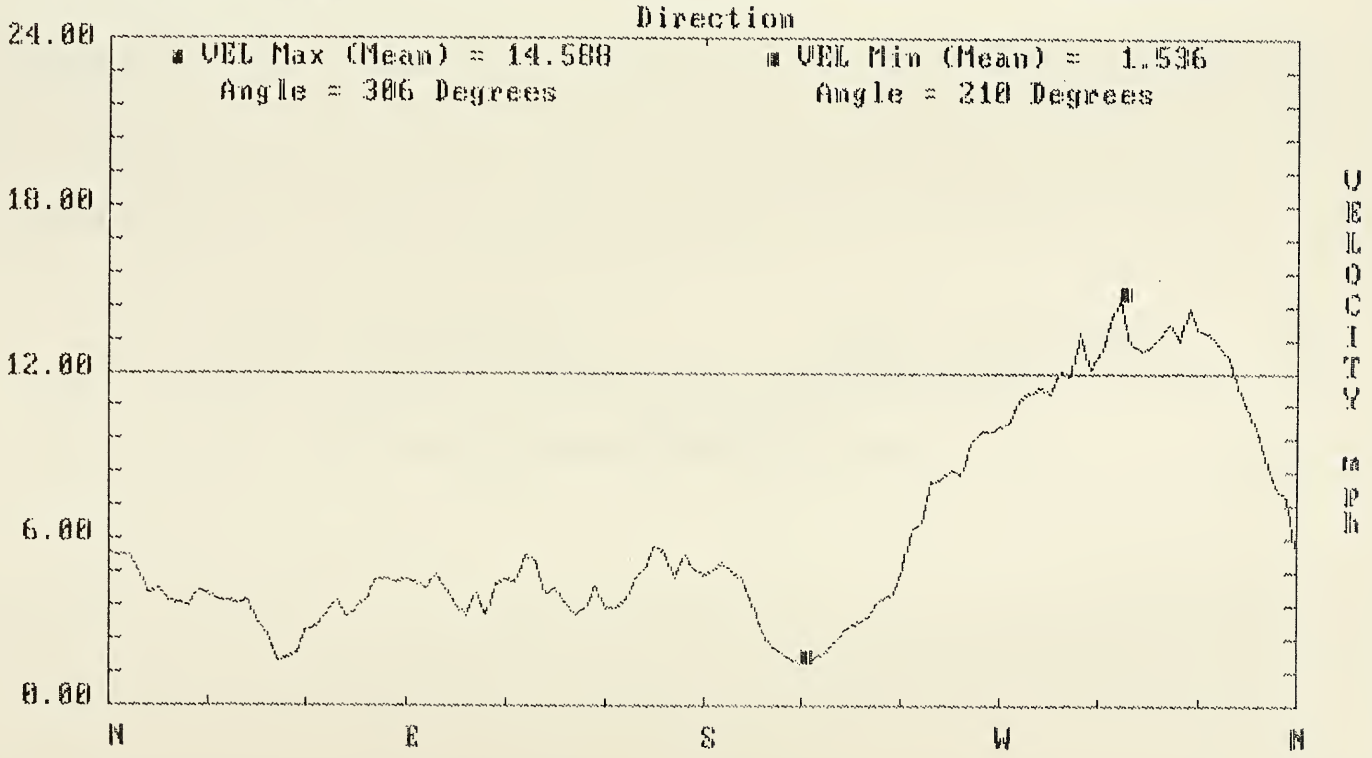

Location #5 Commonwealth Center Ammended Design cw
ca05_26f.1
Direction
■ VEL Max (Mean) = 13.158
Angle = 165 Degrees
■ VEL Min (Mean) = 2.941
Angle = 57 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph


Location #9
Updated No-Build 1996
cw
rm15_09f.2
Direction
■ VEL Max (Mean) = 8.148
Angle = 303 Degrees
■ VEL Min (Mean) = 0.926
Angle = 84 Degrees
24.00
18.00
12.00
6.00
0.00
VELOCITY mph
N
E
S
W
N

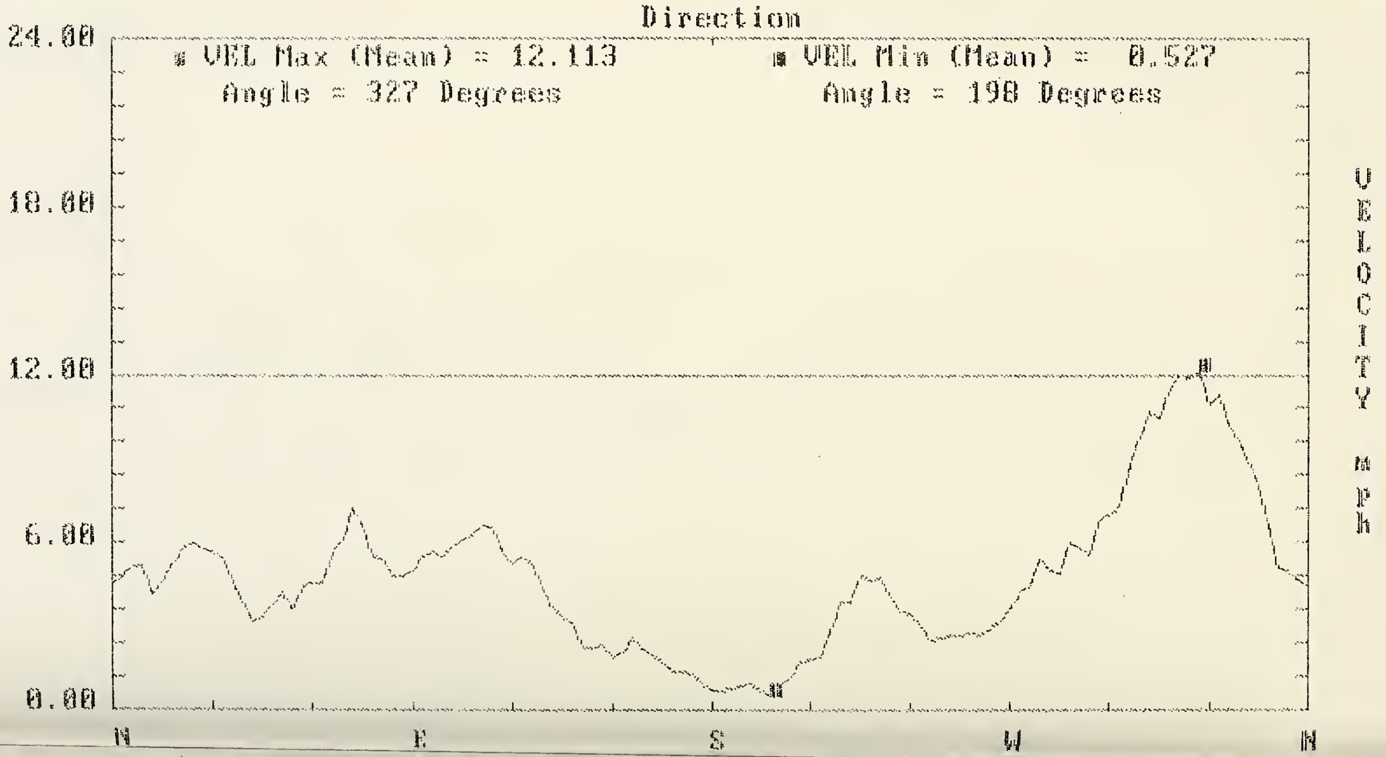
Location #9 Commonwealth Center Ammended Design cw ca15_09f.2

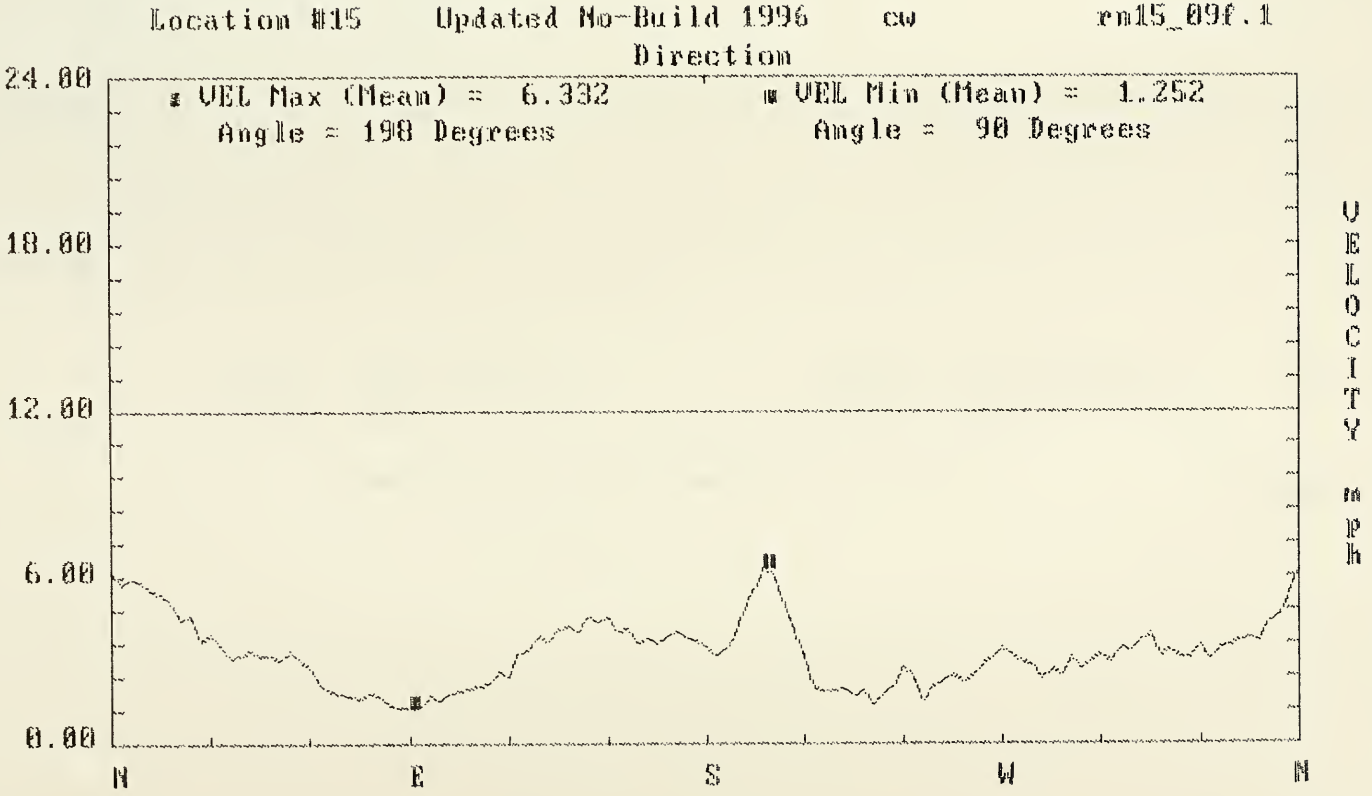


Location #10   Updated No-Build 1996   cw   rn35_10f.2

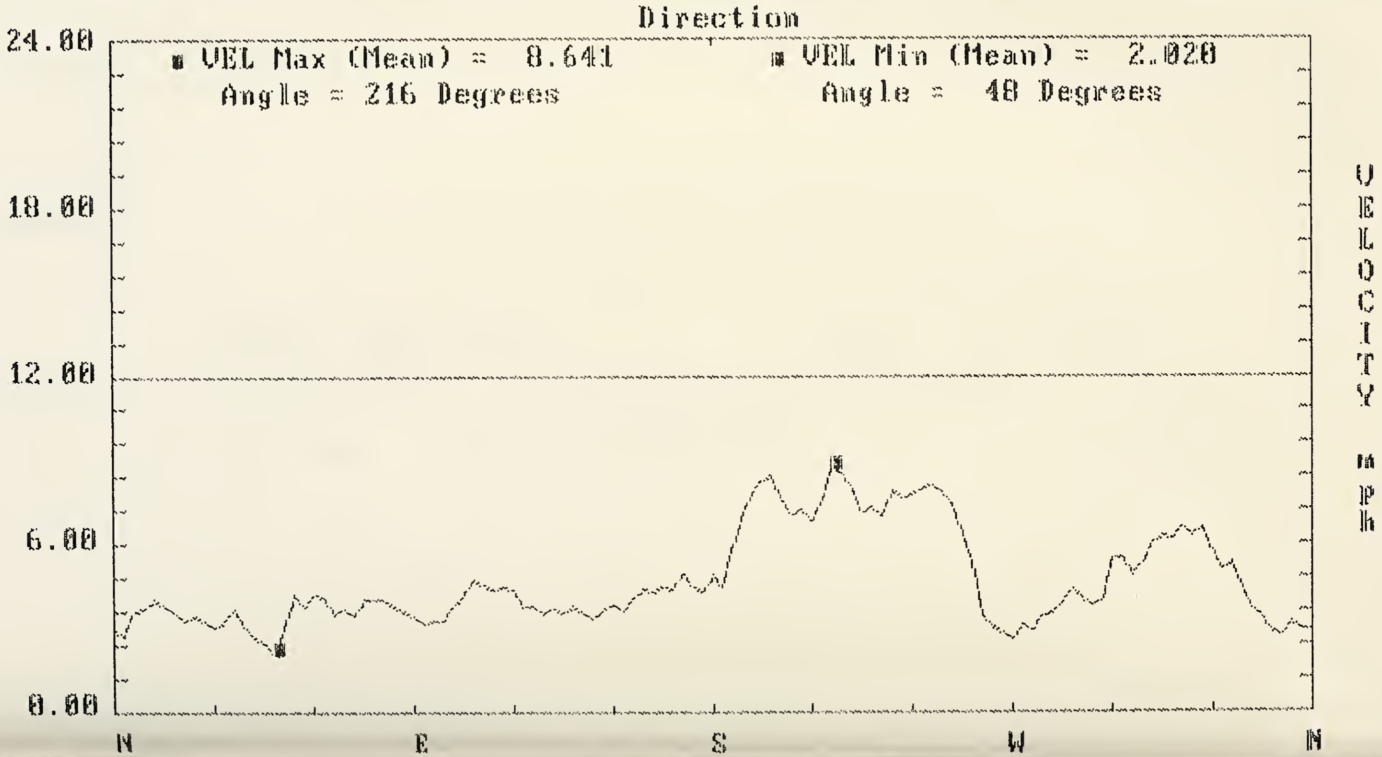


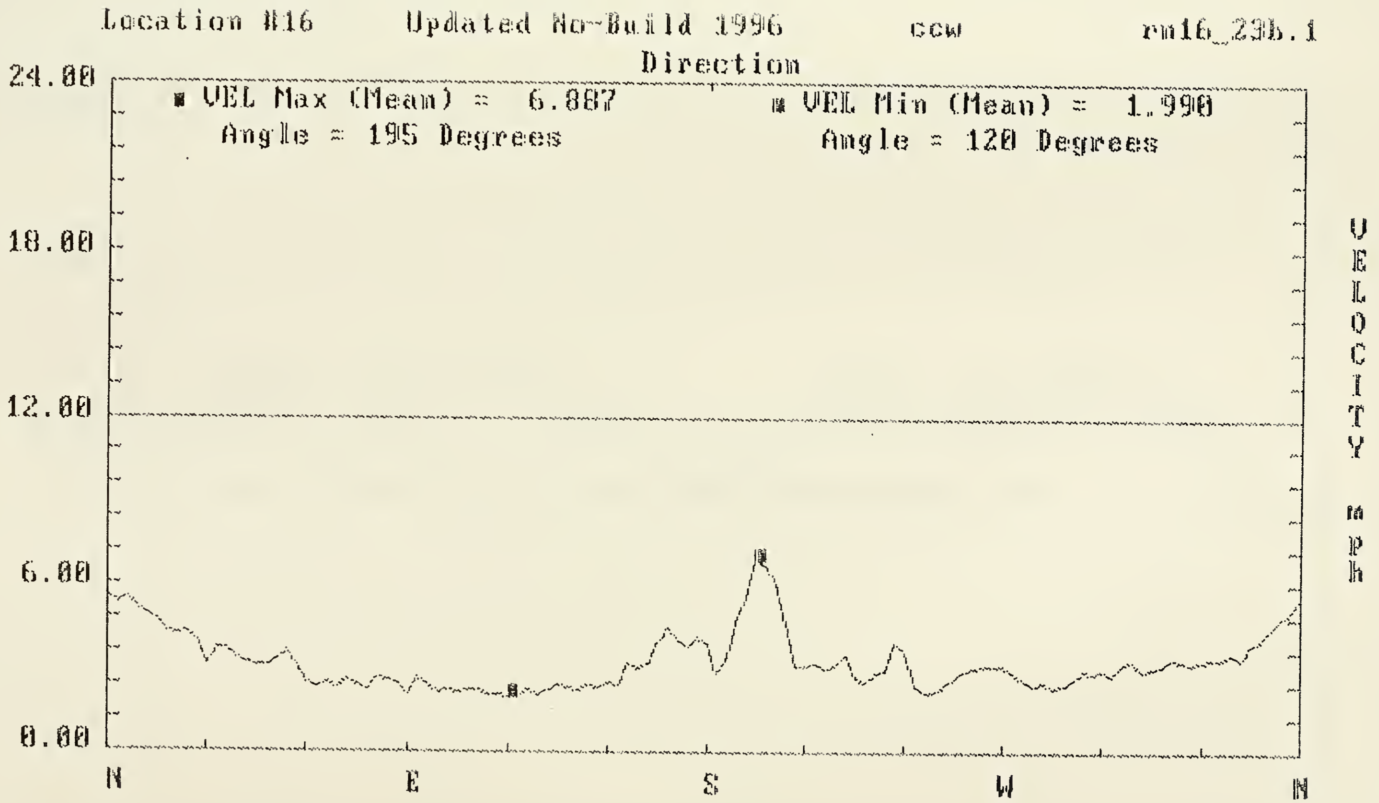
Location #10 Commonwealth Center Amended Design ccw ca10_23b.



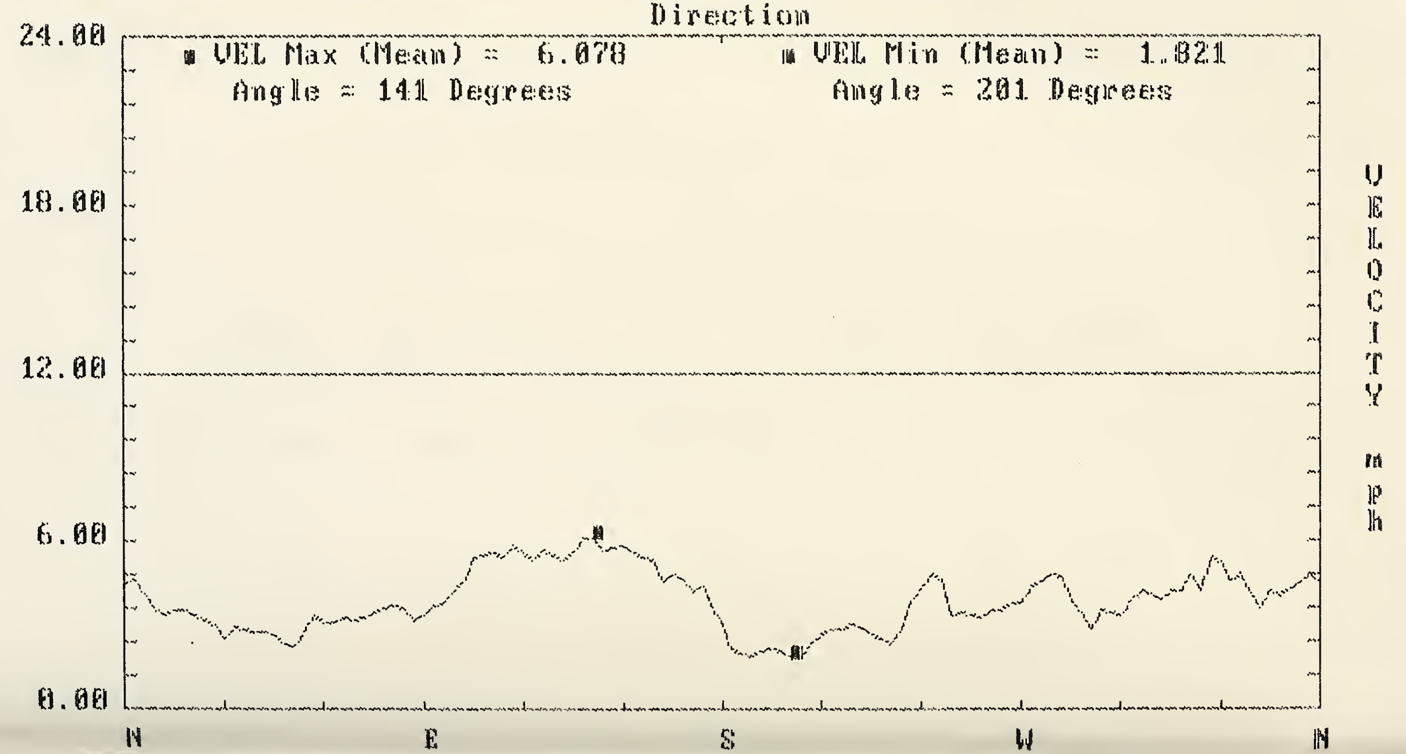

Location #15 Updated No-Build 1996 cw rn15_09f.1
Direction
* VEL Max (Mean) = 6.332
Angle = 198 Degrees
■ VEL Min (Mean) = 1.252
Angle = 90 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph

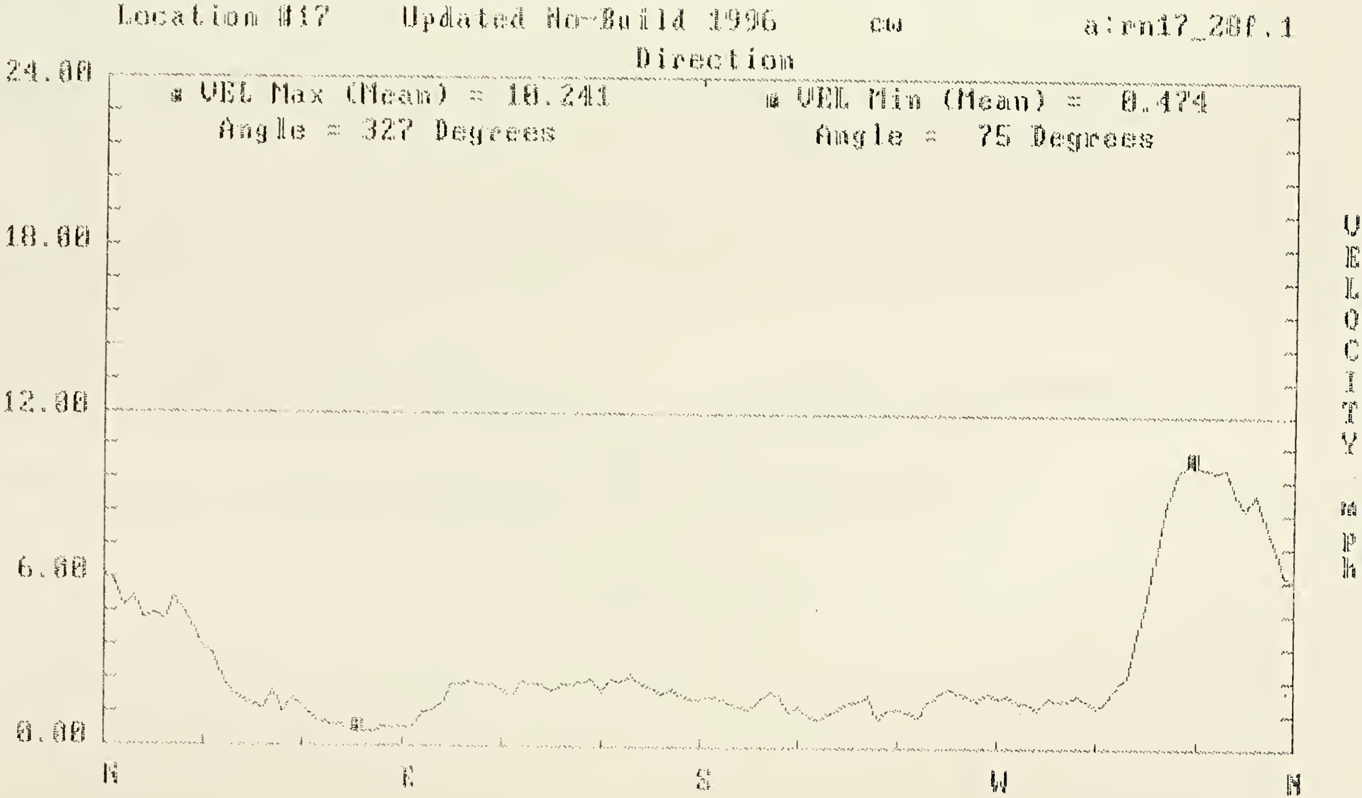
Location #15 Commonwealth Center Ammended Design cw ca15_09f.1



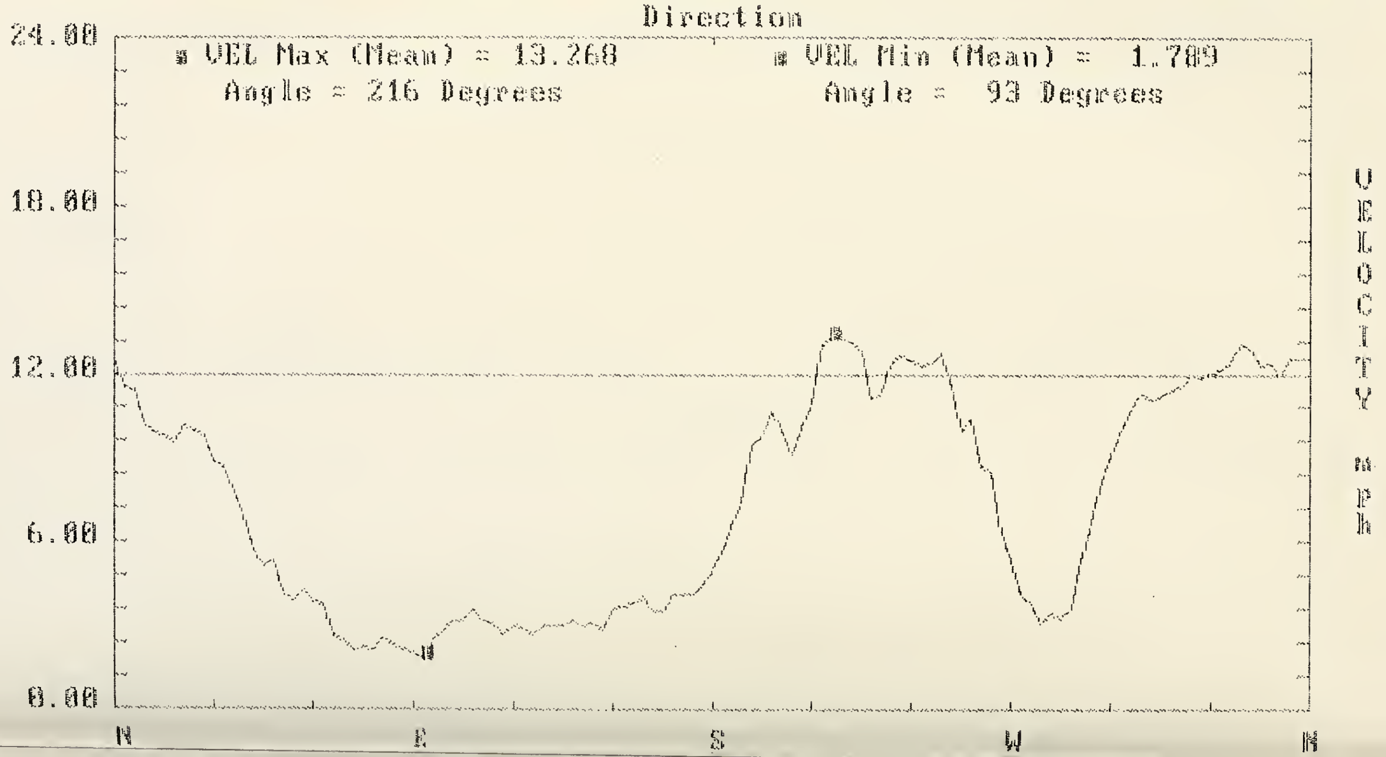

Location #16
Updated No-Build 1996
ccw
rm16_23b.1
Direction
■ VEL Max (Mean) = 6.887
Angle = 195 Degrees
■ VEL Min (Mean) = 1.990
Angle = 120 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph

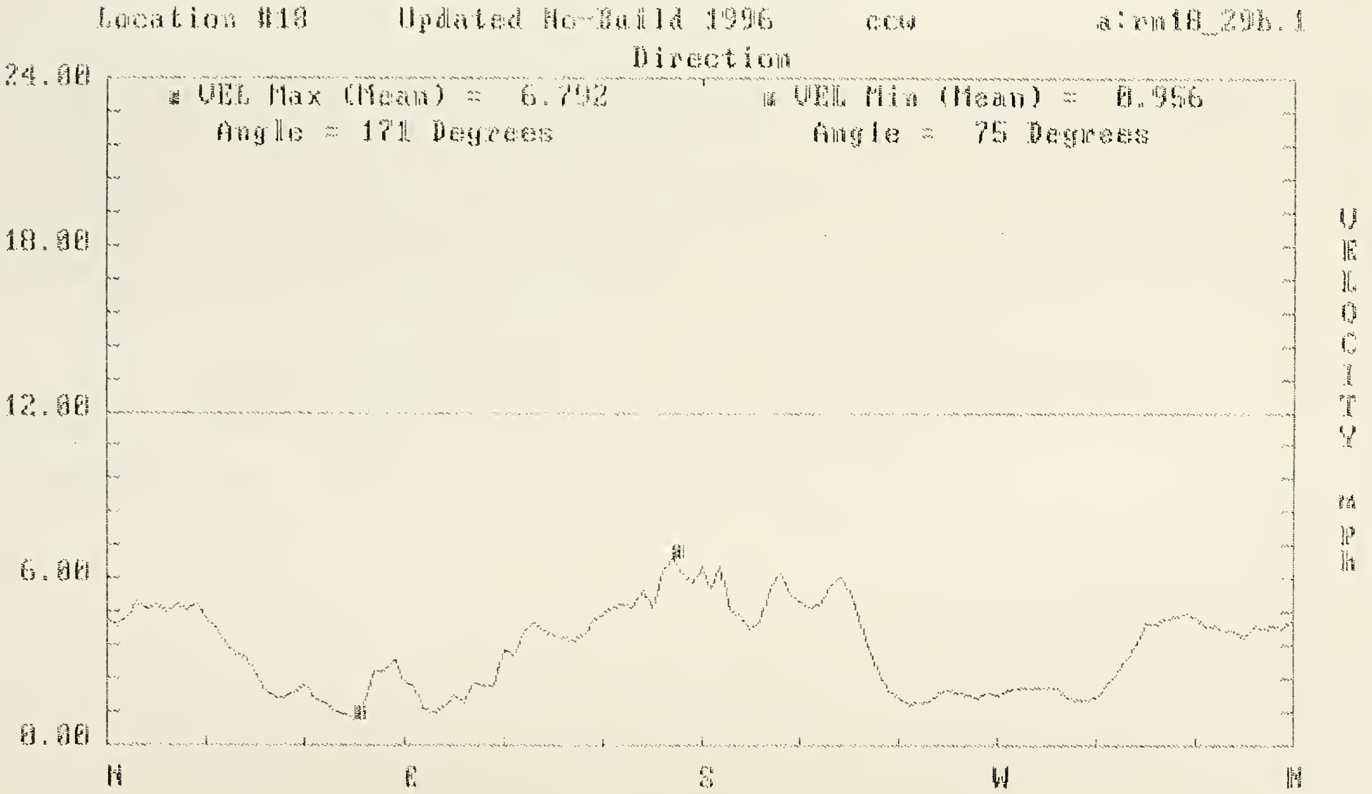
Locfation #16 Commonwealth Center Ammended Design ccw ca16_23b.1

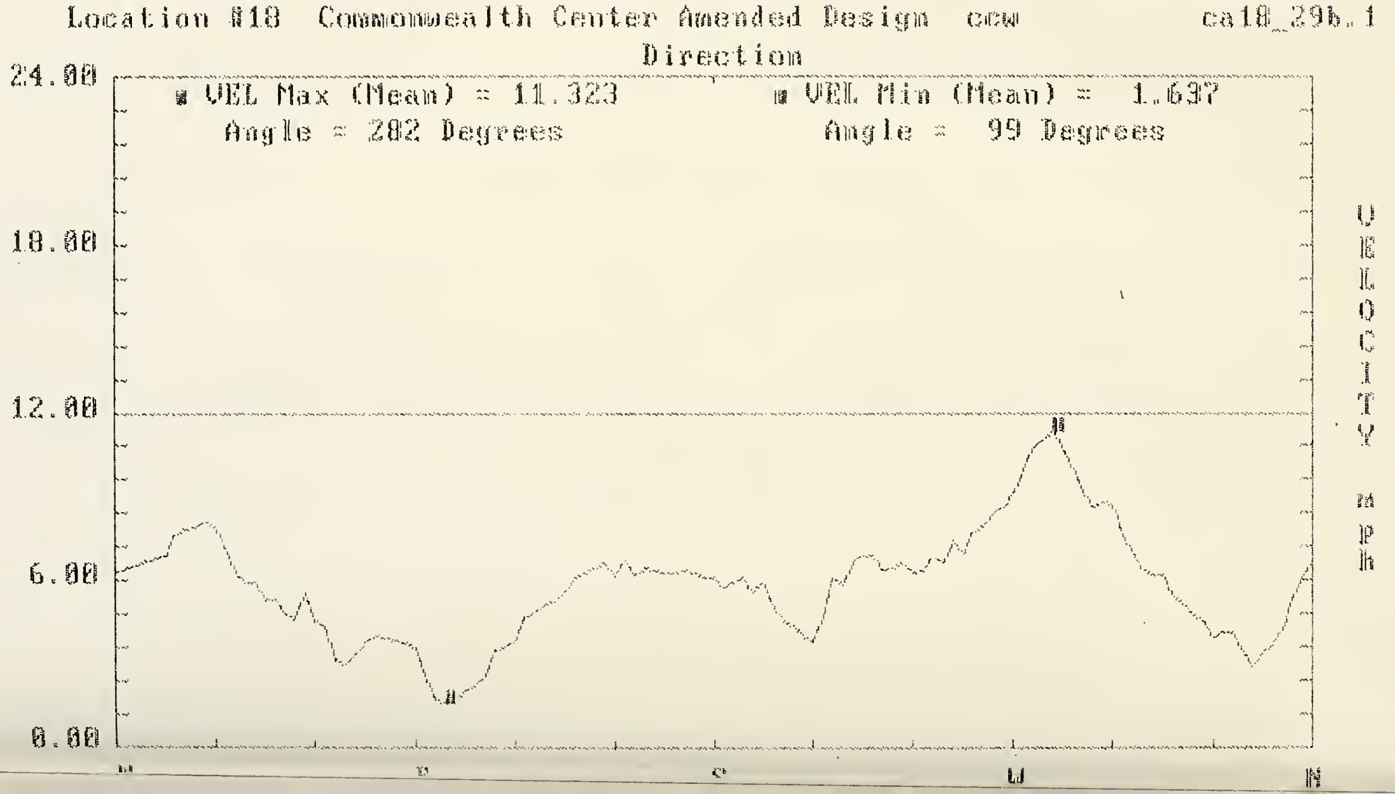


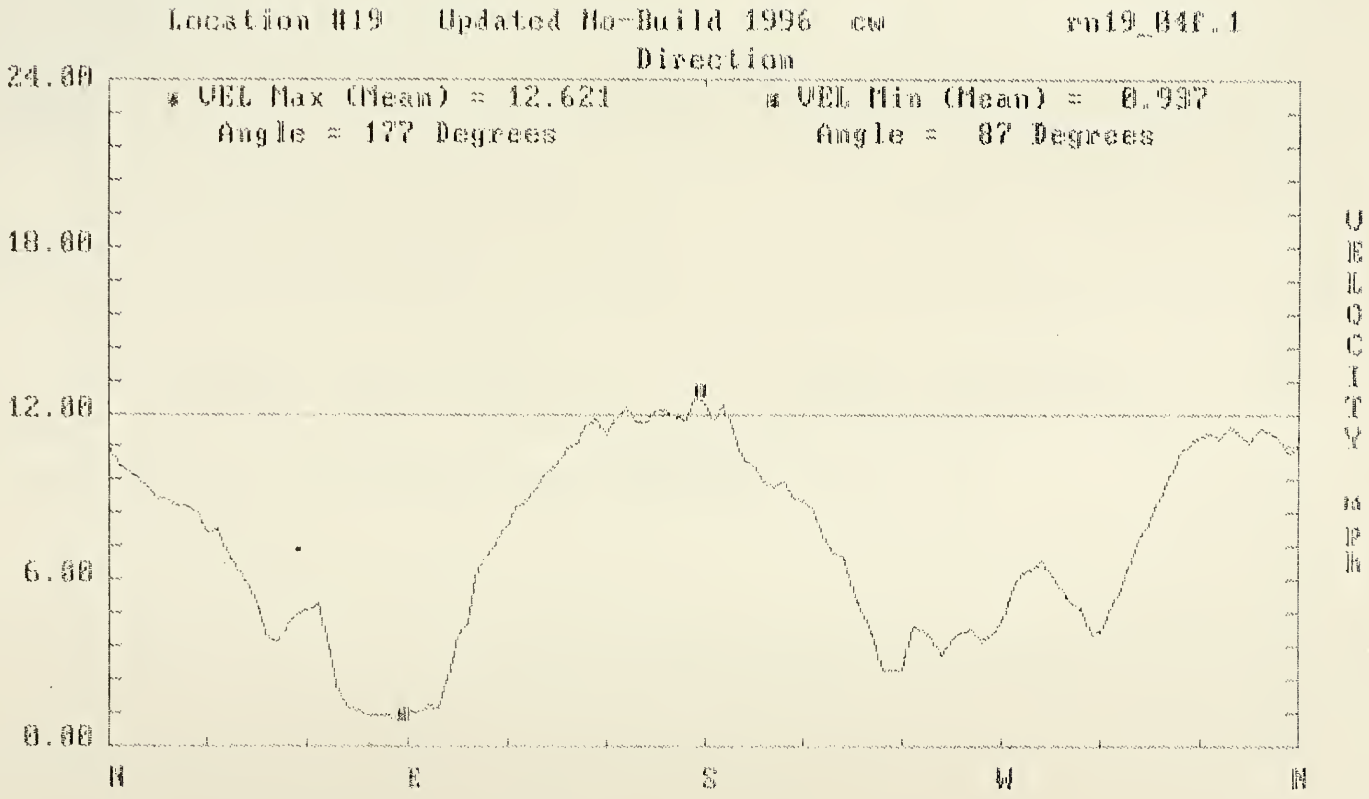

Location #17
Updated No-Build 1996
cw
a:rn17_28f.1
Direction
* VEL Max (Mean) = 10.241
Angle = 327 Degrees
* VEL Min (Mean) = 0.474
Angle = 75 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph

Location #17 Commonwealth Center Amended Design cw a:hc03_11F.1

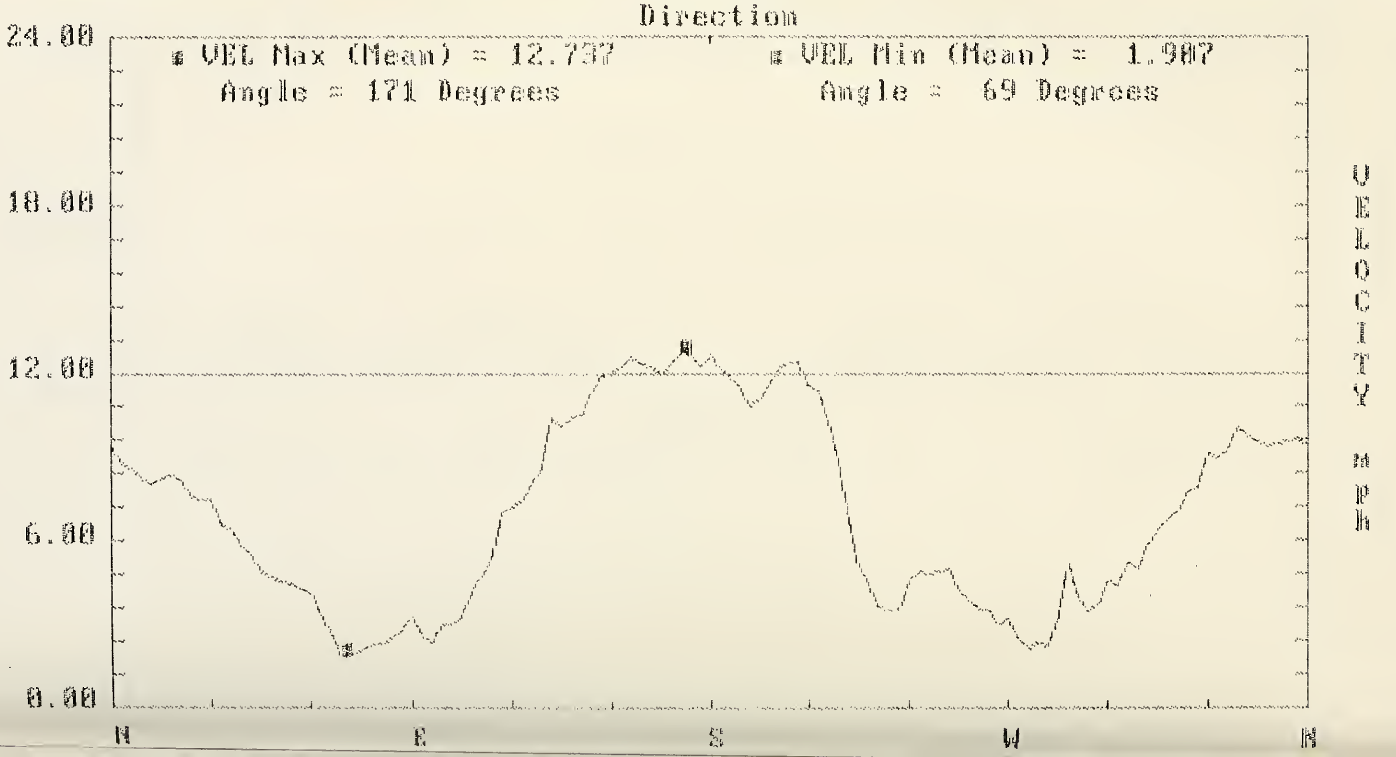



Location #18
Updated No-Build 1996
ccw
a:rn18_29b.1
Direction
* VEL Max (Mean) = 6.792
Angle = 171 Degrees
* VEL Min (Mean) = 0.956
Angle = 75 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph

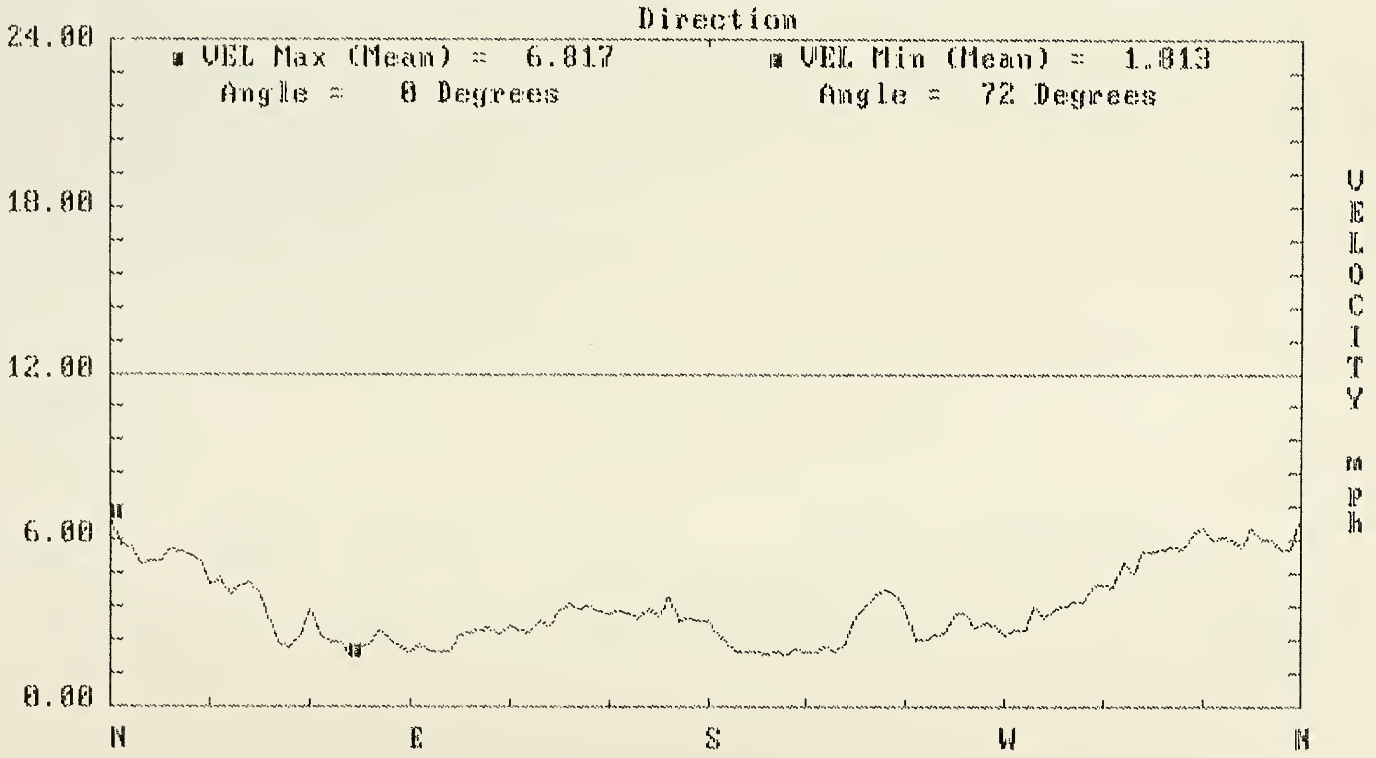

Location #18 Commonwealth Center Amended Design ccw
ca18_29b.1
Direction
VEL Max (Mean) = 11.323
Angle = 282 Degrees
VEL Min (Mean) = 1.637
Angle = 99 Degrees
24.00
18.00
12.00
6.00
0.00
VELOCITY
mph
N
E
S
W
N


Location #19 Updated No-Build 1996 cw
rn19_04f.1
Direction
* VEL Max (Mean) = 12.621
Angle = 177 Degrees
* VEL Min (Mean) = 0.937
Angle = 87 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph

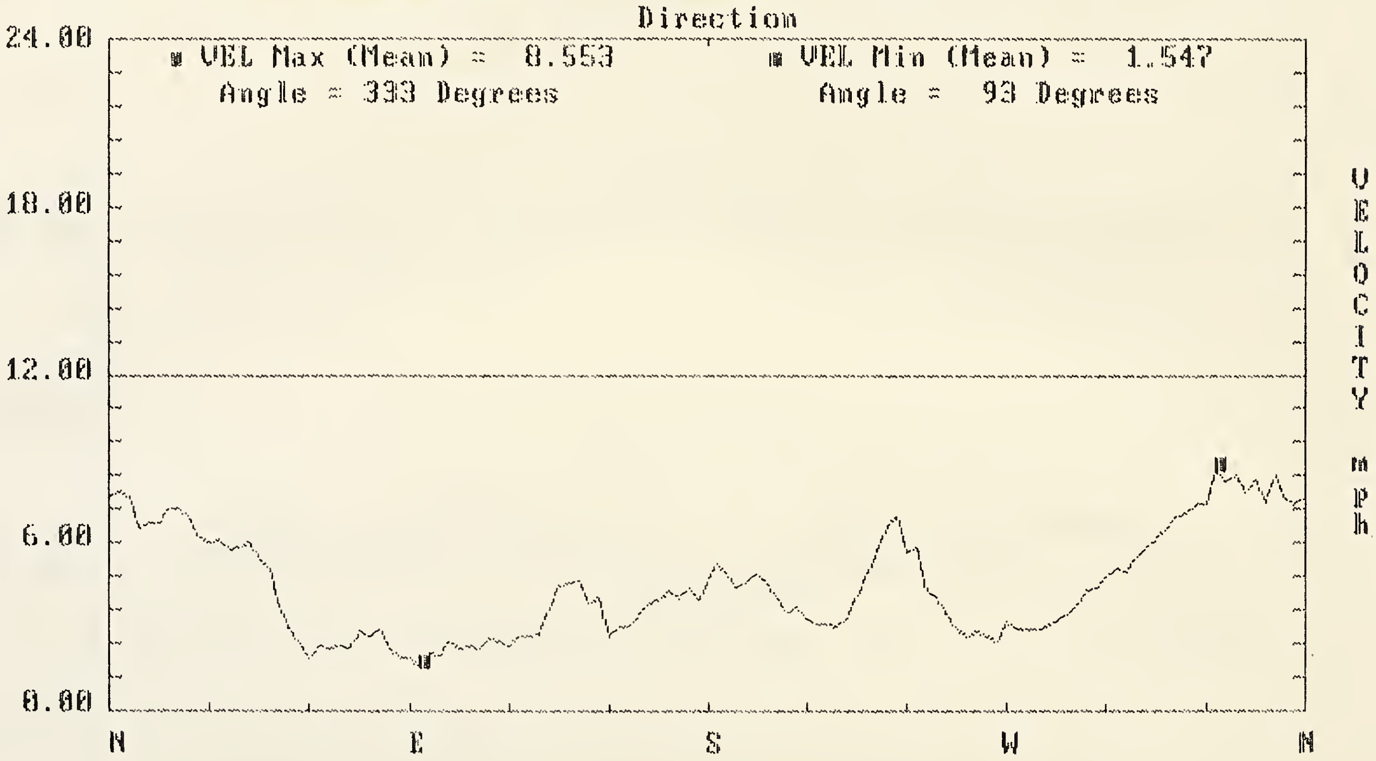
Location #19 Commonwealth Center Amended Design cw a:bc05_16F.1

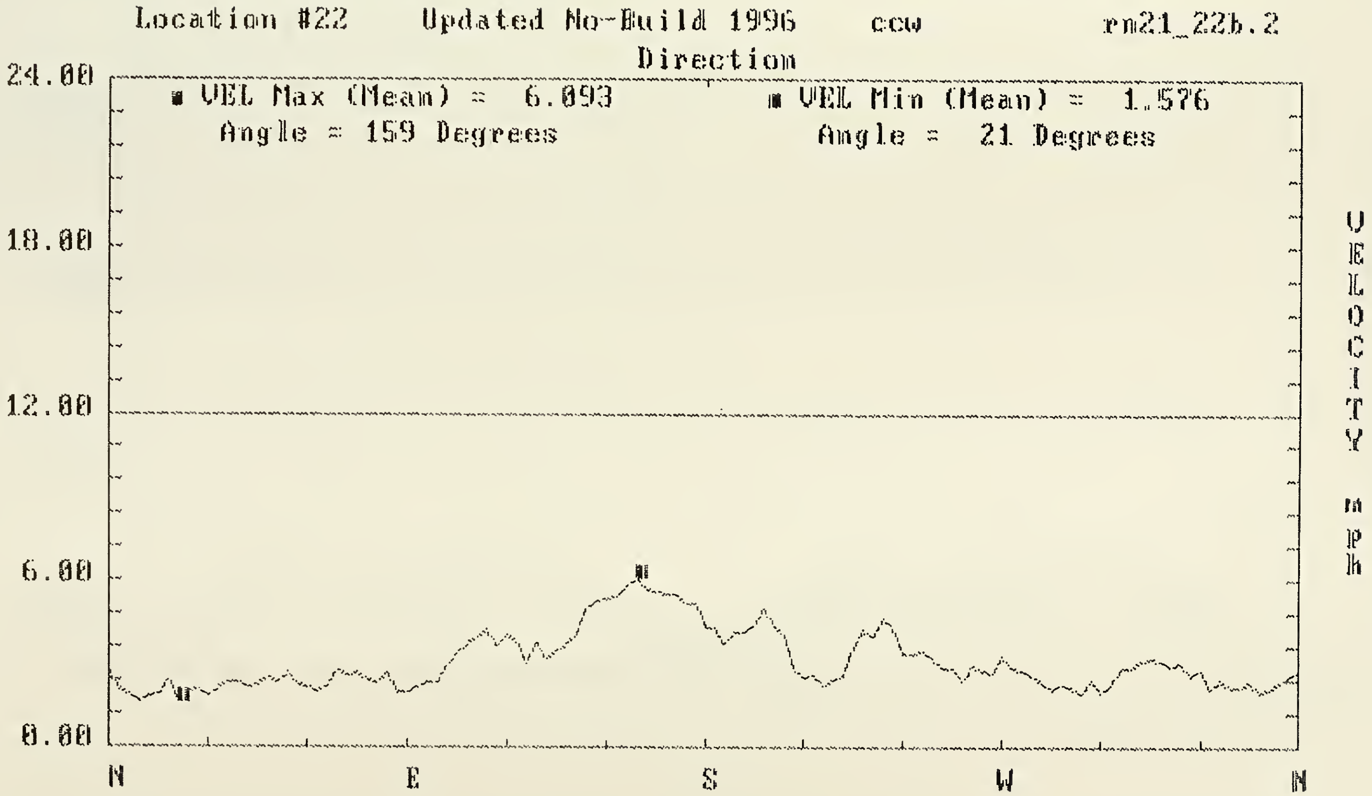


Location #21 Updated No-Build 1996 ccw rn21_22b.1

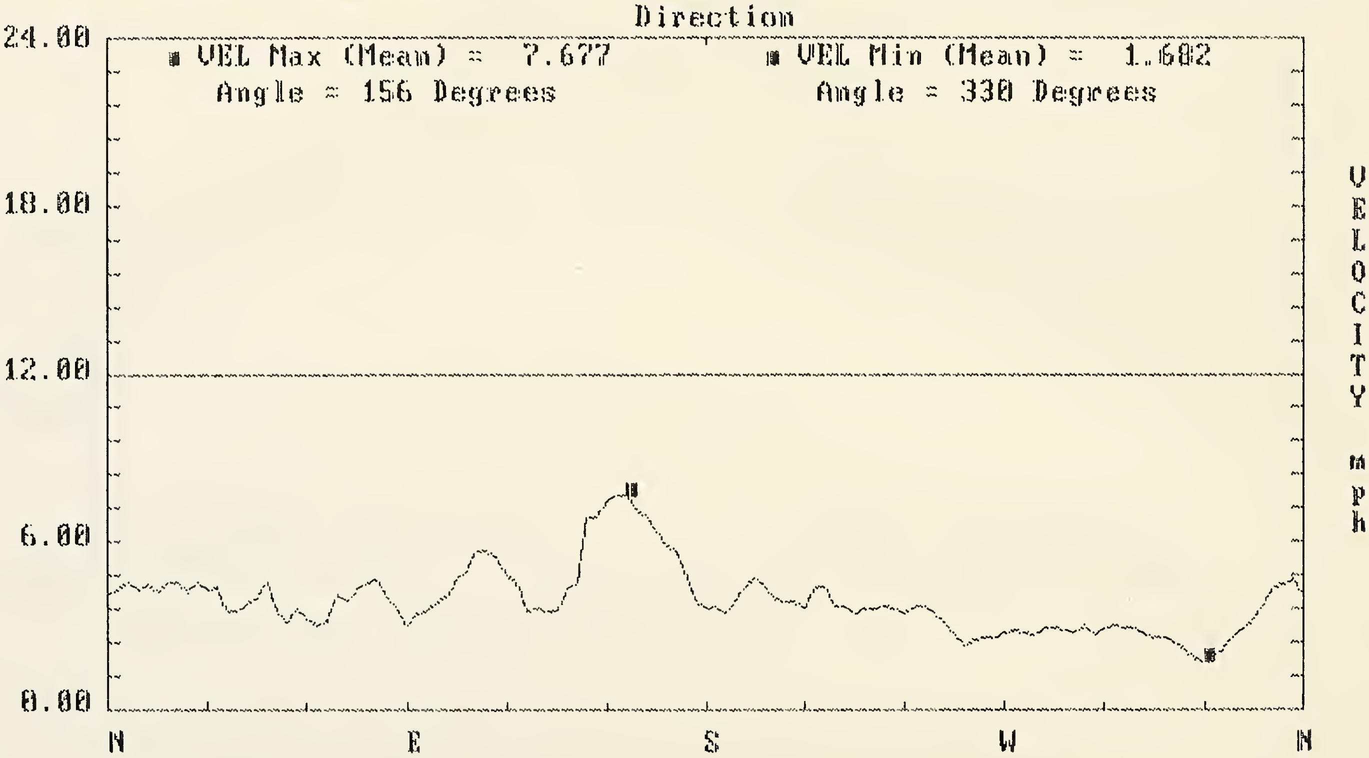


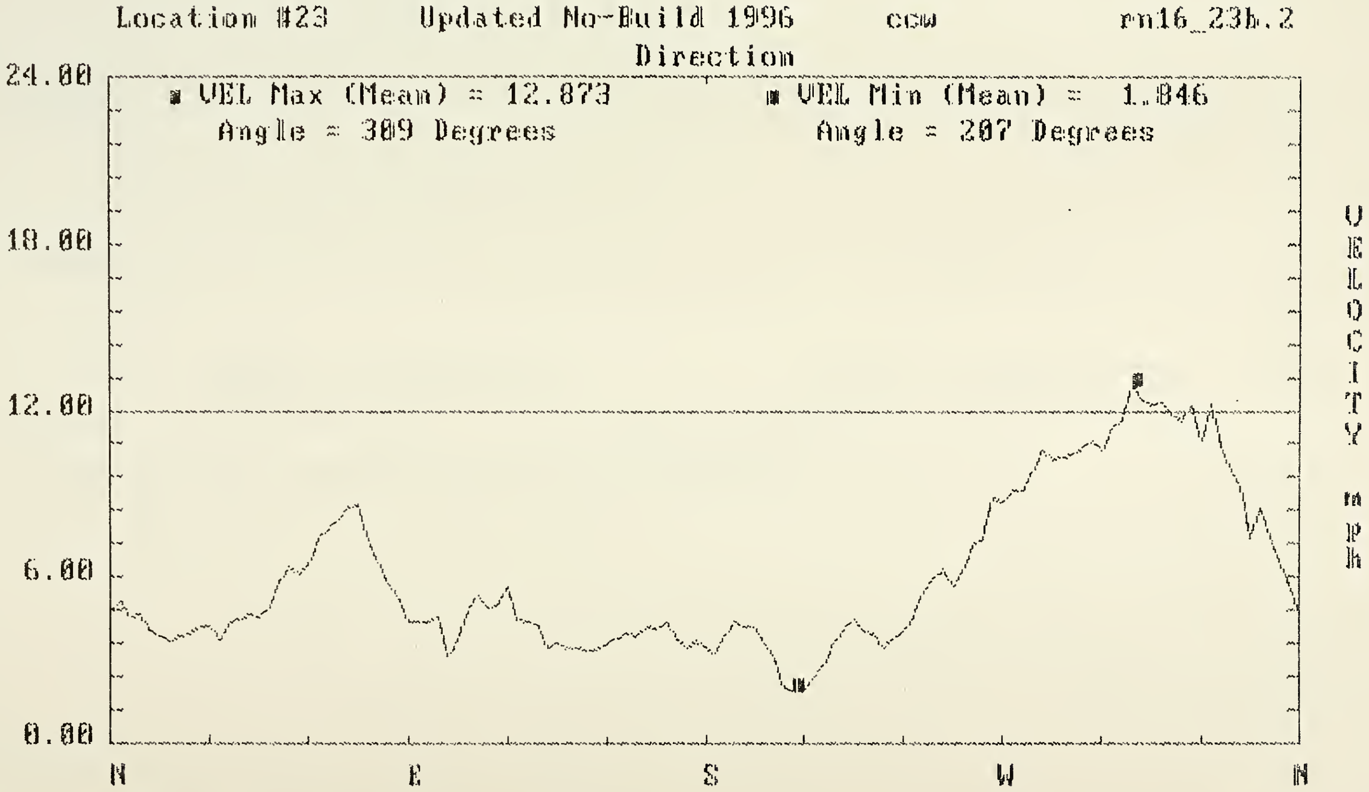
Location #21 Commonwealth Center Ammended Design cw ca21_22f.1

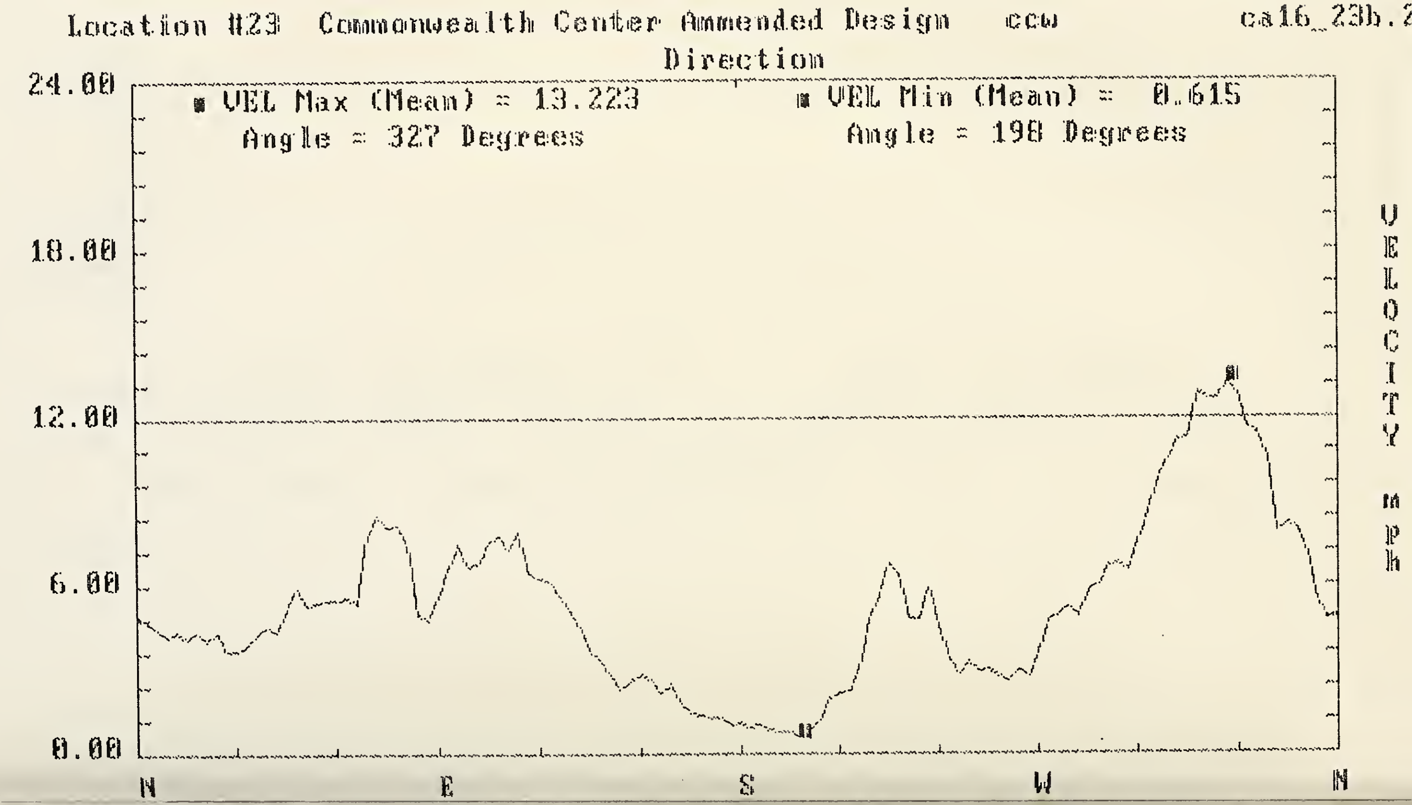


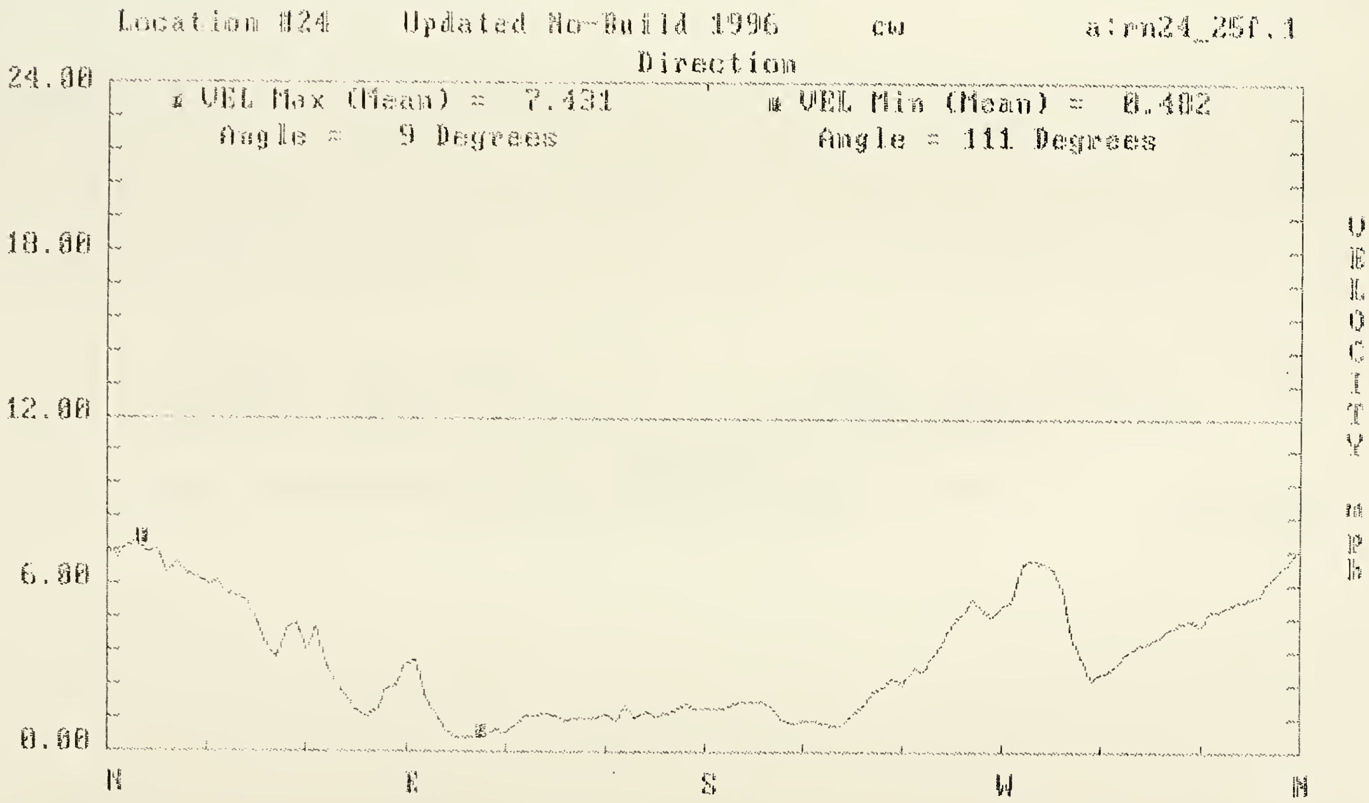

Location #22
Updated No-Build 1996
ccw
rn21_22b.2
Direction
VEL Max (Mean) = 6.093
Angle = 159 Degrees
VEL Min (Mean) = 1.576
Angle = 21 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY
mph

Location #22 Commonwealth Center Ammended Design cw ca21_22f.2

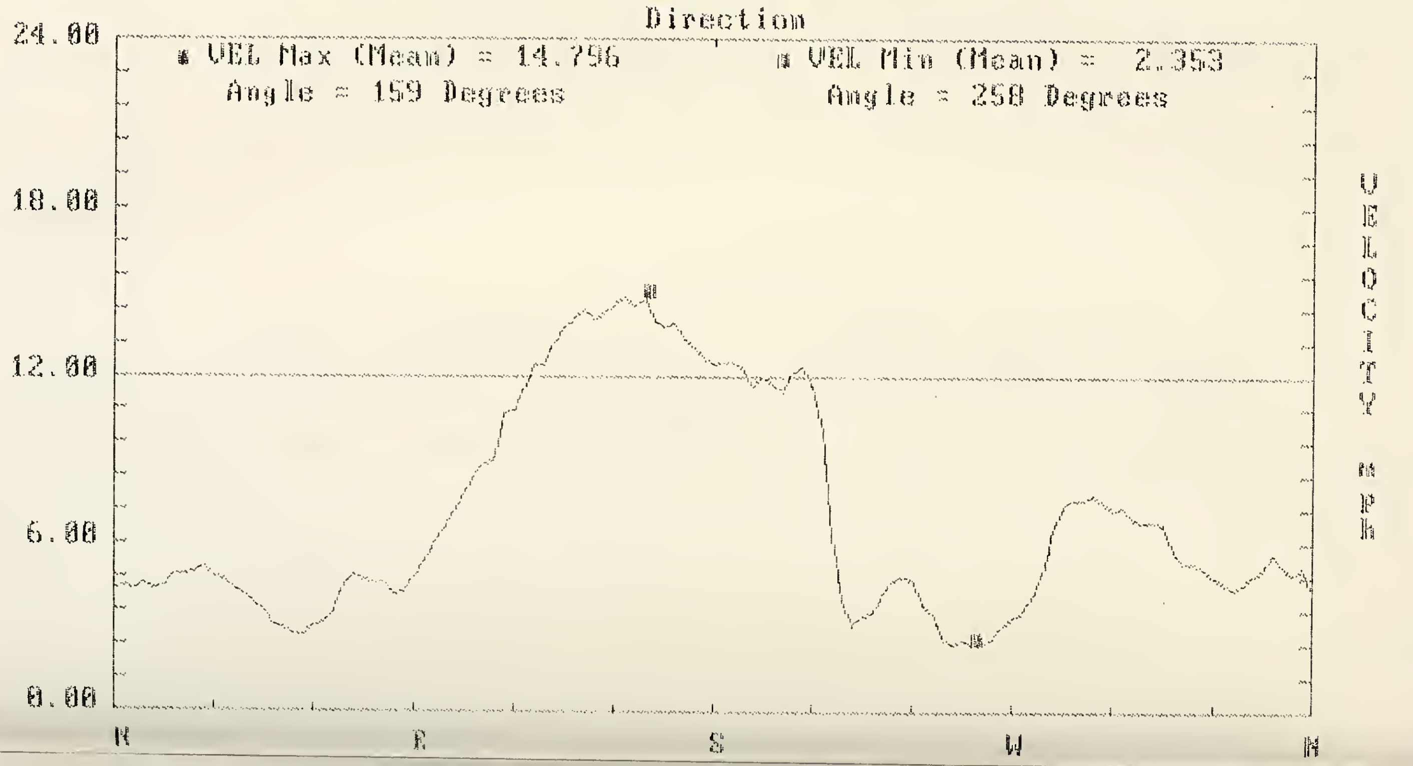


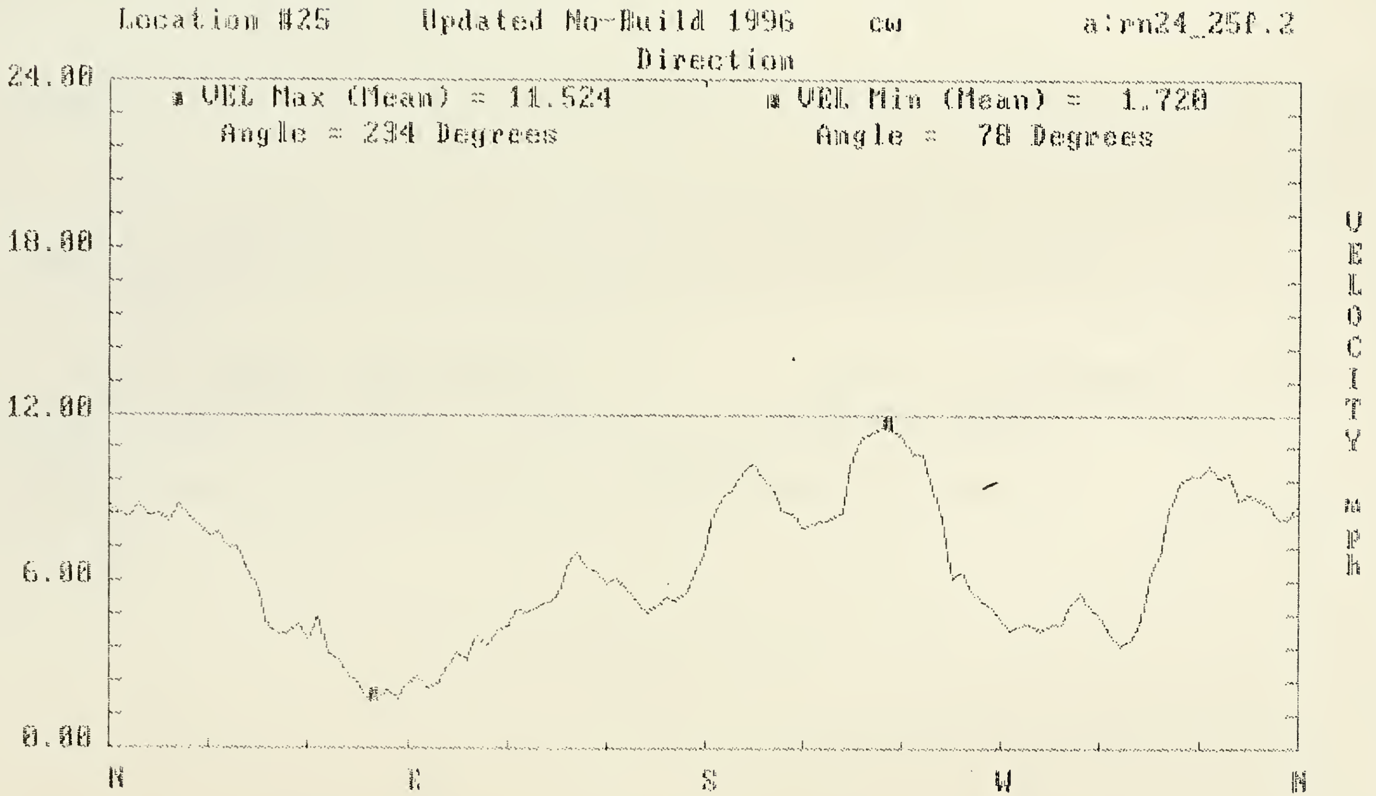

Location #23
Updated No-Build 1996
ccw
rn16_23b.2
Direction
VEL Max (Mean) = 12.873
Angle = 309 Degrees
VEL Min (Mean) = 1.846
Angle = 207 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph


Location #23 Commonwealth Center Ammended Design ccw
ca16_23b.2
Direction
■ VEL Max (Mean) = 13.223
Angle = 327 Degrees
■ VEL Min (Mean) = 0.615
Angle = 198 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph

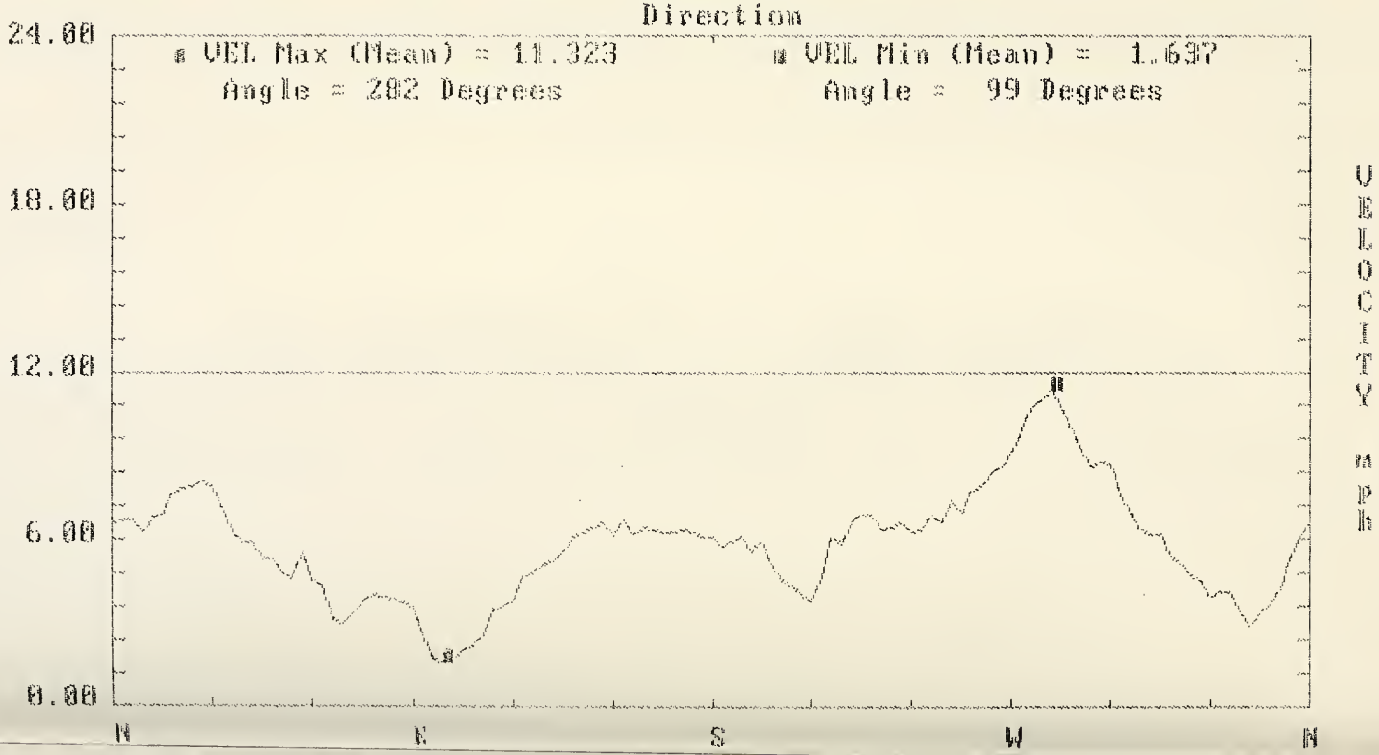

Location #24
Updated No-Build 1996
cw
a:rn24_25f.1
Direction
* VEL Max (Mean) = 7.431
Angle = 9 Degrees
* VEL Min (Mean) = 0.402
Angle = 111 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY
mph

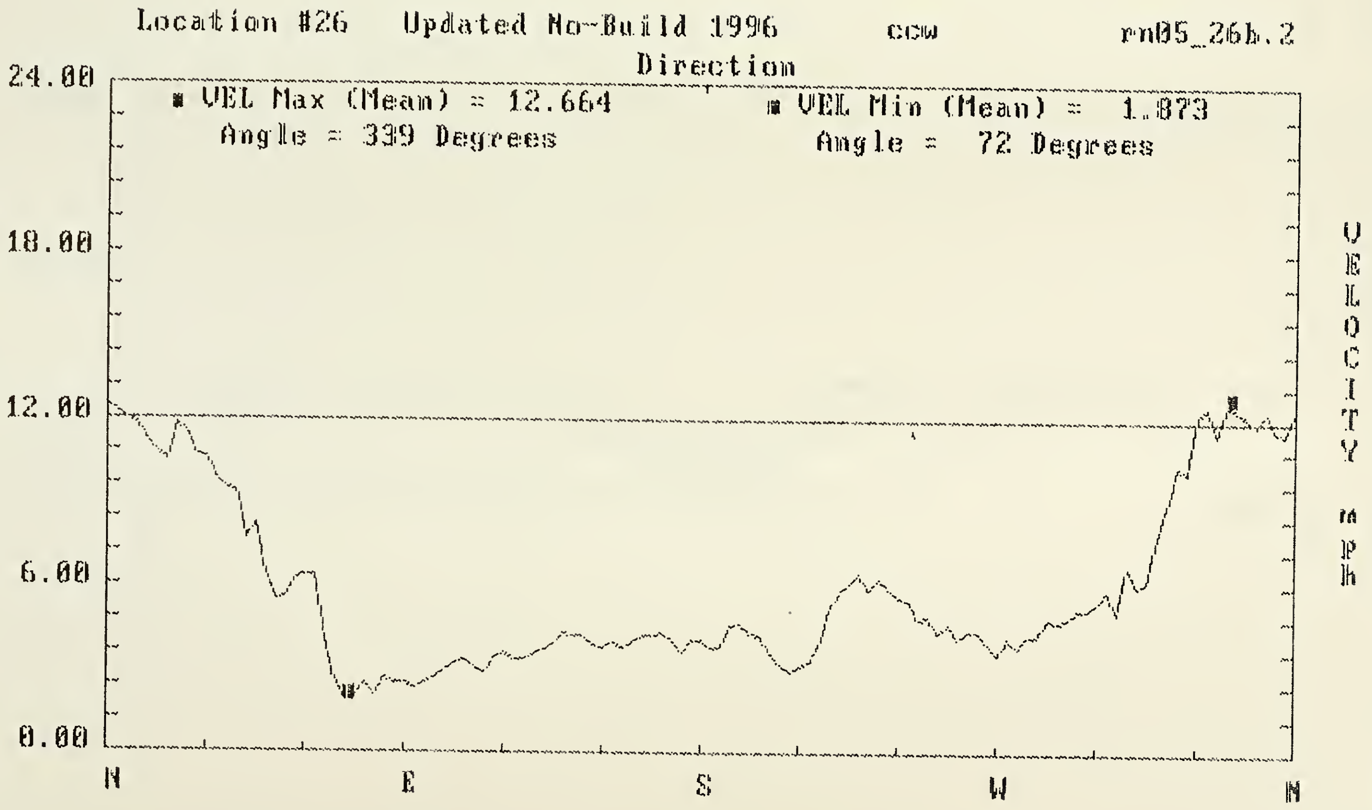
Location #24 Commonwealth Center Amended Design ccw a:bc04_20b.1



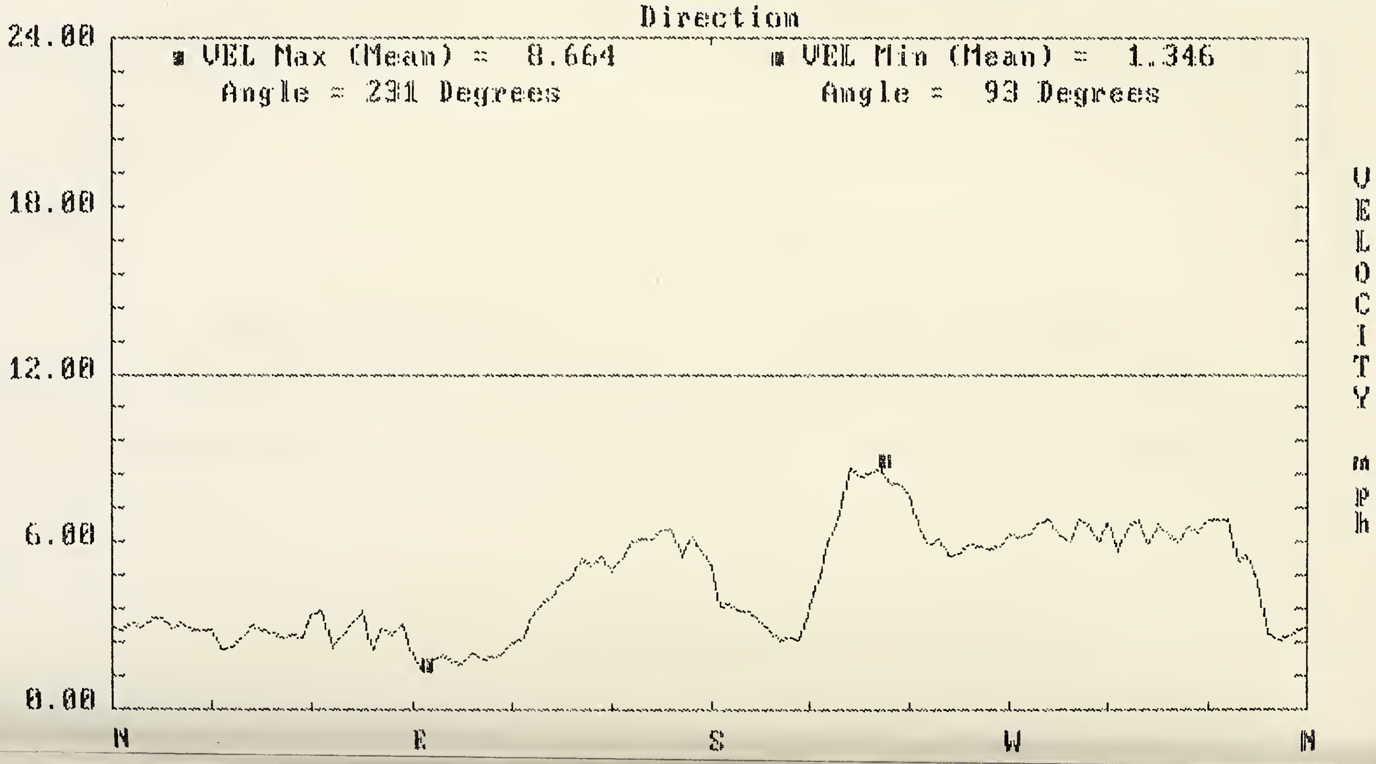

Location #25
Updated No-Build 1996
cw
a:rn24_25f.2
Direction
* VEL Max (Mean) = 11.524
Angle = 234 Degrees
* VEL Min (Mean) = 1.720
Angle = 78 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY
MPH

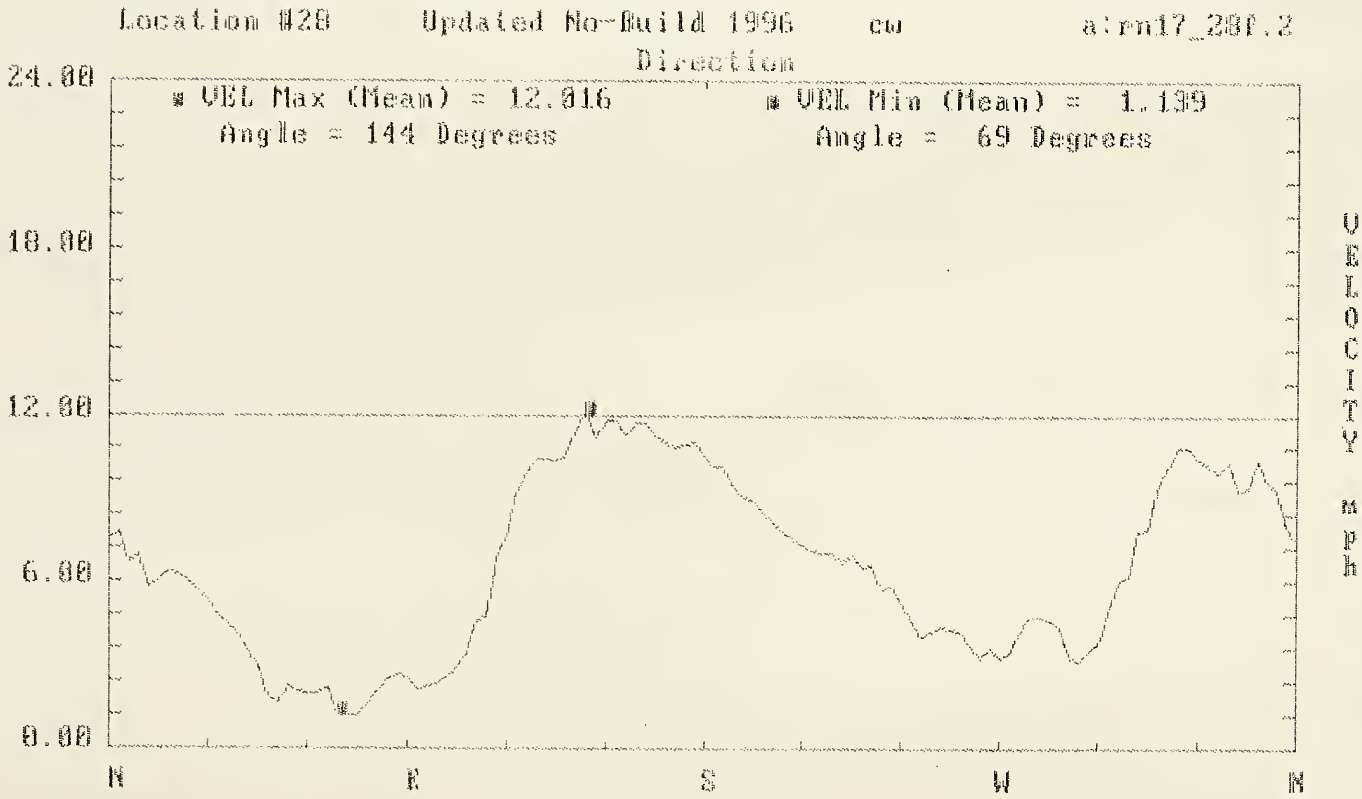
Location #25 Commonwealth Center Amended Design ccw a:bc46_40b.1



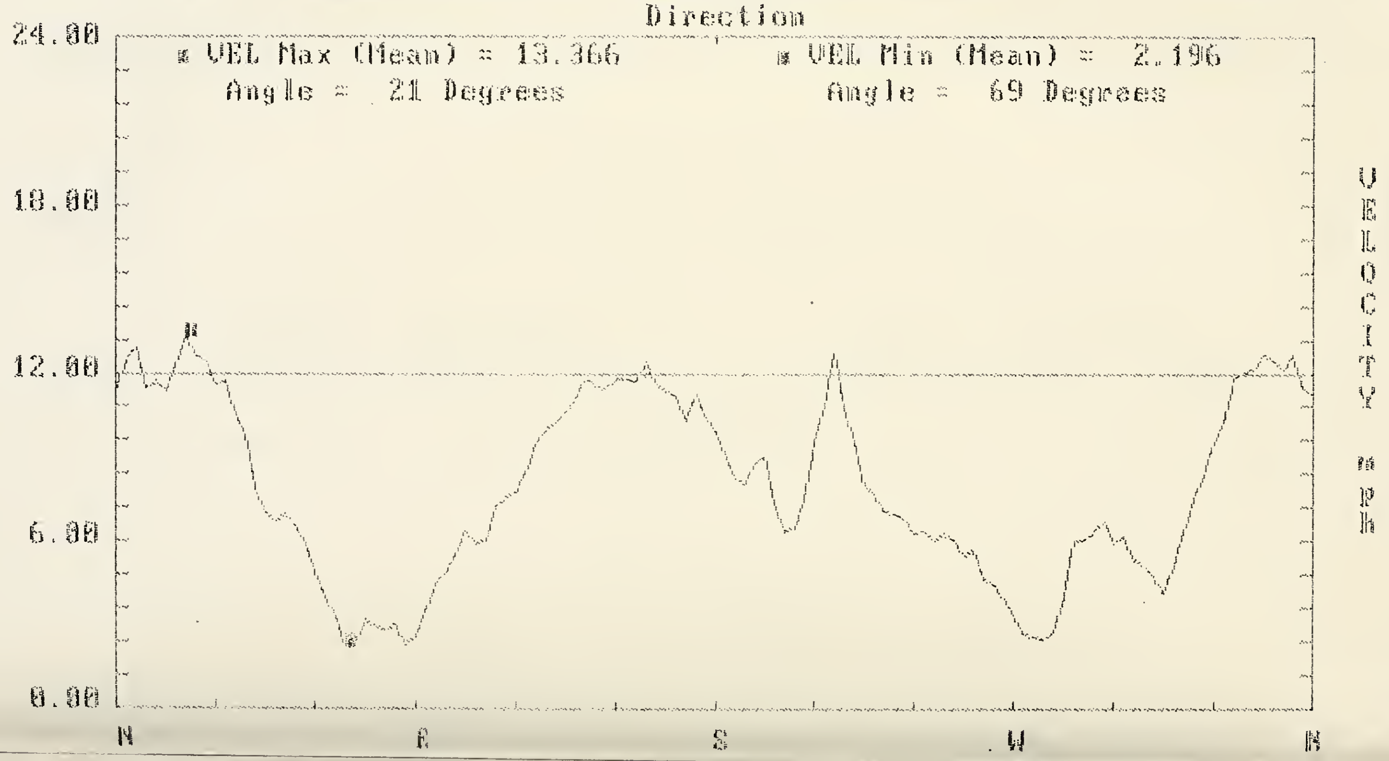

Location #26 Updated No-Build 1996 ccw rn05_26b.2
Direction
VEL Max (Mean) = 12.664
Angle = 339 Degrees
VEL Min (Mean) = 1.873
Angle = 72 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY
mph

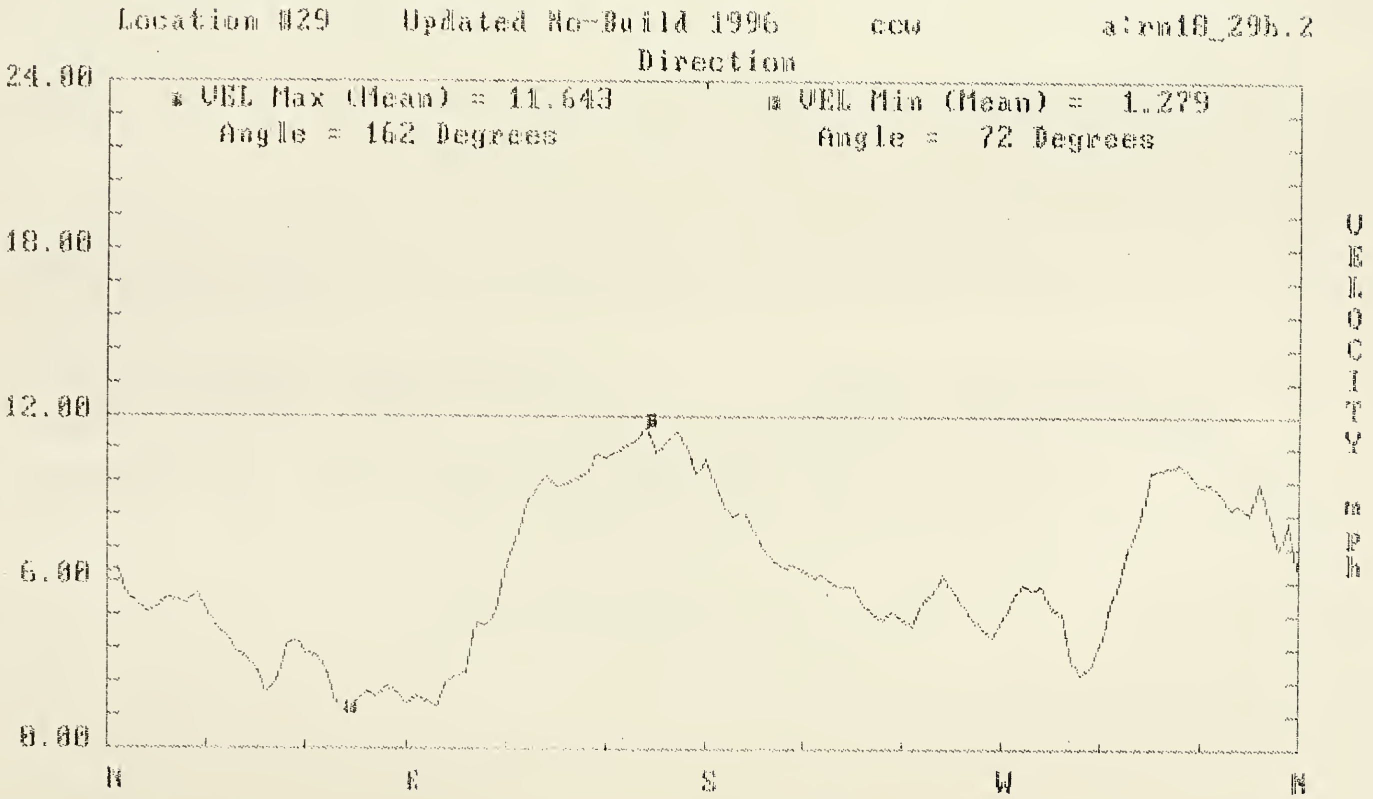
Loaction #26 Commonwealth Center Ammended Design cw ca05_26f.2

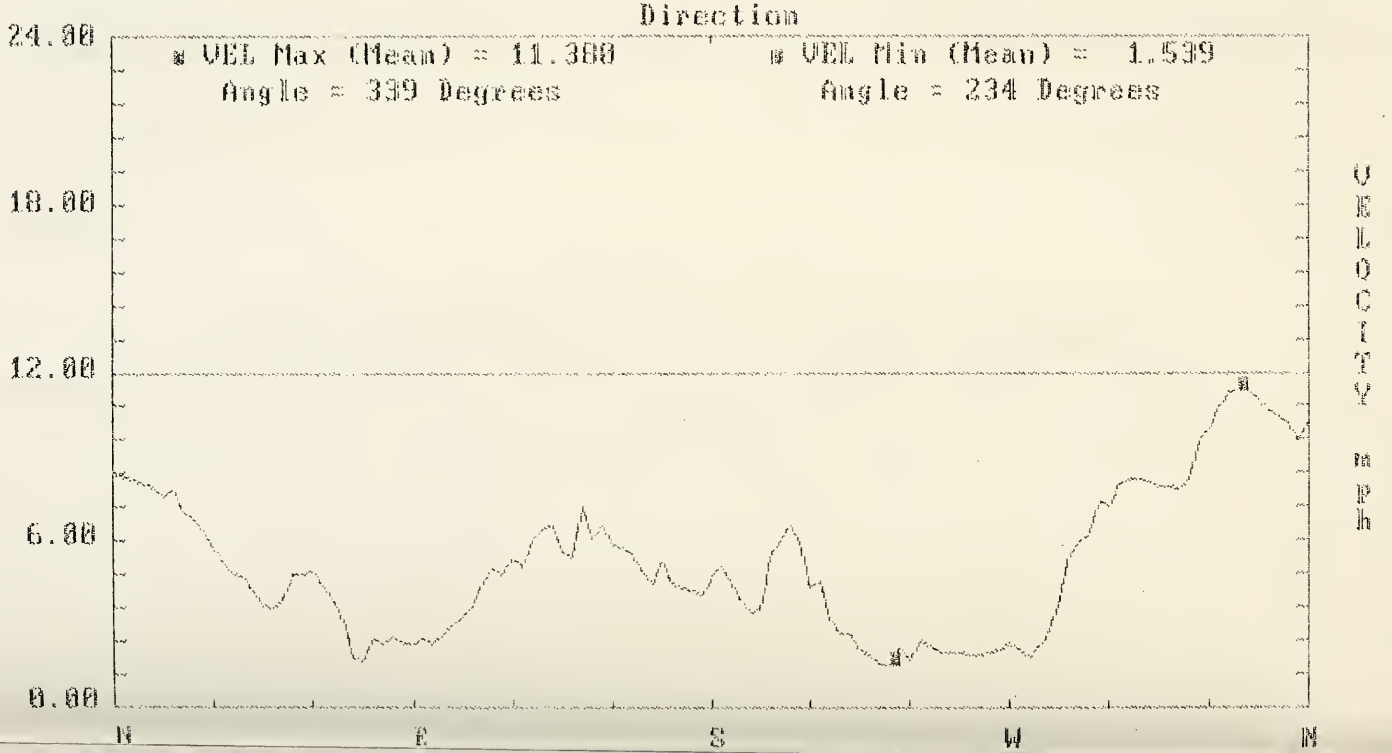


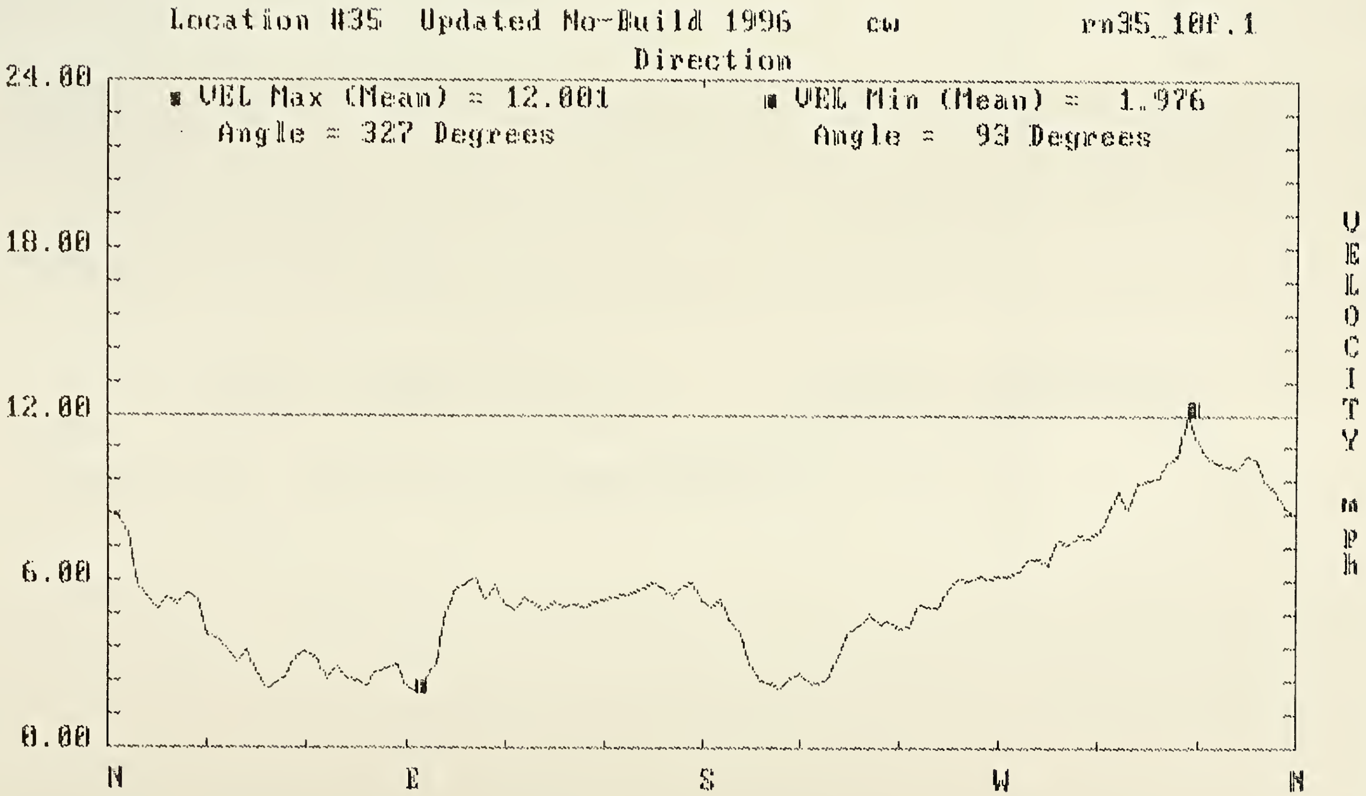

Location #28
Updated No-Build 1996
cw
a:rn17_28f.2
Direction
* VEL Max (Mean) = 12.016
Angle = 144 Degrees
* VEL Min (Mean) = 1.139
Angle = 69 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph

Location #28 Commonwealth Center Amended Design cw a:bc06_31f.1

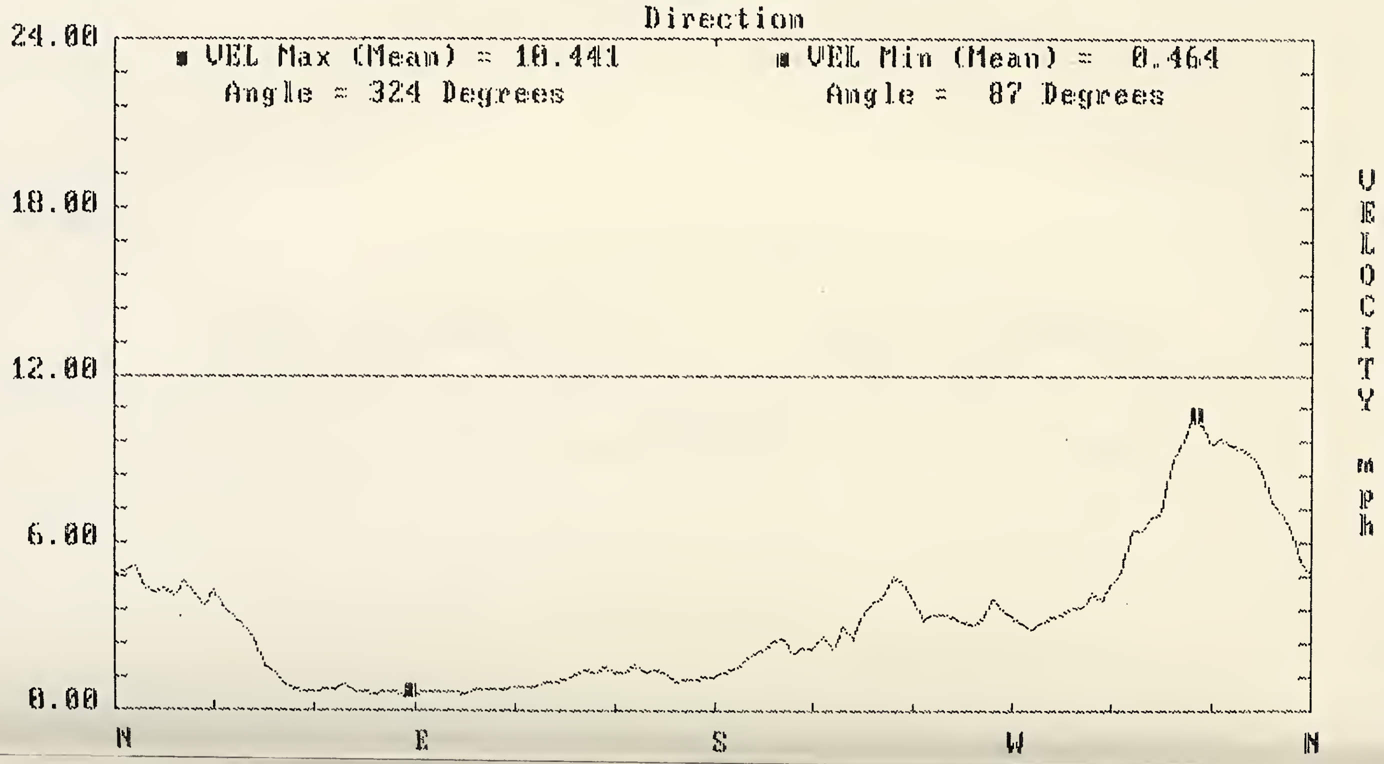



Location #29
Updated No-Build 1996
ccw
a:rn18_29b.2
Direction
* VEL Max (Mean) = 11.643
Angle = 162 Degrees
▪ VEL Min (Mean) = 1.279
Angle = 72 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY
mph


Location #29 Commonwealth Center Amended Design ccw ca18_29b.2


Location #35 Updated No-Build 1996 cw rn35_10F.1
Direction
VEL Max (Mean) = 12.001
Angle = 327 Degrees
VEL Min (Mean) = 1.976
Angle = 93 Degrees
24.00
18.00
12.00
6.00
0.00
N
E
S
W
N
VELOCITY mph

Location #35 Commonwealth Center Ammended Design ccw ca35_10b.1



Statistical Data for Revised No-Build 1996 Condition

Revised No-Build

```
int Location #    4

        Vmean (mph)

obability        FALL     WINTER     SPRING     SUMMER     ANNUAL
-----------------------------------------------------------------------
    50%         1.944      2.229      2.009      1.720      1.957
    15%         3.586      3.811      3.662      3.012      3.564
    10%         3.970      4.259      4.048      3.496      3.937
     5%         4.836      4.341      4.853      3.981      4.739
     1%         6.930      6.668      6.575      5.377      6.469

        Vgust (mph)

obability        FALL     WINTER     SPRING     SUMMER     ANNUAL
-----------------------------------------------------------------------
    50%         3.746      4.258      3.846      3.292      3.770
    20%         6.070      6.635      6.235      5.331      6.075
    15%         6.747      7.356      6.888      5.856      6.739
     5%         9.080      9.661      9.289      7.736      8.972
     1%        12.659     12.670     12.504     10.081     12.120
```

```
Point Location #    5

        Vmean (mph)

Probability          FALL     WINTER     SPRING     SUMMER     ANNUAL
-----------------------------------------------------------------------
        50%         6.592      9.200      7.015      5.210      6.876
        15%        14.349     17.625     15.635     11.793     15.019
        10%        16.353     19.691     17.959     13.590     17.175
         5%        19.334     22.748     21.461     16.279     20.411
         1%        24.921     28.450     27.990     21.365     25.545

        Vgust (mph)

Probability          FALL     WINTER     SPRING     SUMMER     ANNUAL
-----------------------------------------------------------------------
        50%         8.826     11.752      9.315      7.129      9.107
        20%        15.933     19.676     17.135     13.132     16.620
        15%        17.867     21.611     19.283     14.768     18.598
         5%        23.863     27.677     26.232     20.063     24.980
         1%        30.832     34.425     34.137     26.120     32.364
```

Point Location # 9

Revised No-Build

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	3.643	4.750	3.690	3.161	3.765
15%	7.417	9.062	7.372	6.473	7.777
10%	8.426	10.256	9.209	7.362	8.881
5%	9.356	12.045	11.151	8.754	10.671
1%	13.047	15.577	15.080	11.593	14.268

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	6.299	8.228	6.343	5.386	6.479
20%	11.357	14.086	12.115	9.800	11.866
15%	12.652	15.607	13.678	10.933	13.297
5%	16.980	20.659	19.086	14.822	18.207
1%	22.258	26.641	25.817	19.663	24.385

Point Location # 10

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	5.351	6.213	5.495	4.298	5.672
15%	13.571	17.151	15.164	11.329	14.468
10%	15.602	19.261	17.554	13.113	16.655
5%	18.602	22.390	21.060	15.805	19.918
1%	24.189	28.256	27.669	20.922	26.156

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	8.345	11.808	8.514	6.812	8.578
20%	16.644	21.136	18.241	13.874	17.521
15%	18.733	23.345	20.721	15.710	19.623
5%	25.304	30.296	28.517	21.557	27.002
1%	32.687	38.154	37.318	28.317	35.328

Point Location # 15

Revised No-Build

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	2.404	2.894	2.551	1.968	2.444
15%	4.415	4.958	4.700	3.706	4.508
10%	4.938	5.581	5.273	4.153	5.008
5%	5.912	6.480	6.182	4.939	5.948
1%	8.346	8.516	8.118	6.870	8.011

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	4.332	5.225	4.577	3.613	4.397
20%	7.004	8.070	7.483	5.884	7.161
15%	7.750	8.803	8.220	6.517	7.883
5%	10.267	11.187	10.711	8.611	10.373
1%	13.983	14.223	13.736	11.418	13.593

Point Location # 16

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	2.549	2.905	2.641	2.154	2.554
15%	4.461	4.675	4.673	3.829	4.511
10%	4.937	5.452	5.139	4.325	4.976
5%	5.853	6.301	6.031	5.042	5.883
1%	7.955	8.425	7.998	6.950	7.913

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	4.645	5.339	4.793	3.936	4.655
20%	7.260	8.084	7.598	6.276	7.346
15%	7.919	8.789	8.310	6.867	8.002
5%	10.284	11.056	10.709	8.931	10.398
1%	13.542	14.334	13.776	11.770	13.535

Point Location # 17

Revised No-Build

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	1.734	2.173	1.841	1.418	1.759
15%	5.171	6.373	5.821	3.448	5.331
10%	7.095	9.031	7.940	4.870	7.347
5%	10.118	12.154	11.168	7.493	10.461
1%	15.537	17.487	16.838	12.430	16.005

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	3.455	4.348	3.669	2.773	3.493
20%	6.832	8.626	7.452	5.051	6.925
15%	8.306	10.507	9.252	5.964	8.474
5%	14.149	16.759	15.427	10.790	14.582
1%	20.856	23.496	22.623	16.889	21.581

Point Location # 18

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	2.321	2.601	2.478	1.905	2.322
15%	4.896	5.233	4.999	4.026	4.828
10%	5.742	6.033	5.817	4.786	5.646
5%	7.001	7.377	7.014	5.908	6.883
1%	9.822	10.164	9.610	8.273	9.579

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	4.156	4.655	4.427	3.496	4.155
20%	7.269	7.783	7.544	5.988	7.170
15%	8.208	8.723	8.431	6.799	8.058
5%	11.582	11.966	11.530	9.638	11.268
1%	16.041	16.384	15.417	13.144	15.429

Revised No-Build

```
int Location #  19

          Vmean (mph)

obability        FALL      WINTER     SPRING     SUMMER     ANNUAL
--------------------------------------------------------------------
     50%        4.959      5.013      5.414      4.070      5.054
     15%       10.200     11.487     10.772      8.059     10.205
     10%       11.851     13.109     12.357      9.345     11.791
      5%       14.550     15.712     14.854     11.408     14.356
      1%       20.344     20.811     19.310     15.693     19.643


          Vgust (mph)

obability        FALL      WINTER     SPRING     SUMMER     ANNUAL
--------------------------------------------------------------------
     50%        7.396      8.786      7.875      6.180      7.493
     20%       12.351     13.899     13.015     10.097     12.408
     15%       13.741     15.288     14.414     11.172     13.755
      5%       18.802     20.038     19.152     14.944     18.543
      1%       26.068     26.199     25.101     19.903     24.850
```

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nt Location #  21

          Vmean (mph)

obability        FALL      WINTER     SPRING     SUMMER     ANNUAL
--------------------------------------------------------------------
     50%        2.879      3.619      3.015      2.364      2.922
     15%        5.643      6.710      6.052      4.639      5.805
     10%        6.441      7.588      6.921      5.301      6.659
      5%        7.705      8.858      8.303      6.399      7.942
      1%       10.290     11.453     10.976      8.690     10.649


          Vgust (mph)

obability        FALL      WINTER     SPRING     SUMMER     ANNUAL
--------------------------------------------------------------------
     50%        5.015      6.120      5.228      4.154      5.079
     20%        8.331      9.715      8.813      6.957      8.514
     15%        9.199     10.636      9.765      7.734      9.421
      5%       12.168     13.672     12.898     10.304     12.482
      1%       15.870     17.303     16.695     13.534     16.199
```

Revised No-Build

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Point Location #  22

          Vmean (mph)

Probability          FALL     WINTER     SPRING     SUMMER     ANNUAL
-------------------------------------------------------------------------
      50%           2.247      2.515      2.315      1.950      2.257
      15%           4.151      4.392      4.207      3.646      4.069
      10%           4.778      4.896      4.780      4.056      4.681
       5%           5.808      5.832      5.702      4.883      5.606
       1%           8.394      7.997      7.681      6.680      7.750

          Vgust (mph)

Probability          FALL     WINTER     SPRING     SUMMER     ANNUAL
-------------------------------------------------------------------------
      50%           4.047      4.520      4.188      3.564      4.062
      20%           6.631      6.970      6.739      5.759      6.557
      15%           7.369      7.680      7.449      6.372      7.228
       5%          10.192     10.123      9.907      8.539      9.742
       1%          14.833     13.906     13.259     11.427     13.453




Point Location #  23

          Vmean (mph)

Probability          FALL     WINTER     SPRING     SUMMER     ANNUAL
-------------------------------------------------------------------------
      50%           5.104      6.374      5.258      4.106      5.237
      15%          11.510     14.640     12.856      9.395     12.241
      10%          13.308     16.534     14.955     10.970     14.196
       5%          15.976     19.322     18.107     13.429     17.125
       1%          20.993     24.527     23.932     18.022     22.683

          Vgust (mph)

Probability          FALL     WINTER     SPRING     SUMMER     ANNUAL
-------------------------------------------------------------------------
      50%           8.439     11.016      8.664      6.872      8.592
      20%          15.306     19.204     16.669     12.551     16.007
      15%          17.177     21.217     18.899     14.143     18.042
       5%          23.263     27.576     26.037     19.500     24.667
       1%          30.248     34.748     34.070     25.768     32.307
```

oint Location # 24

Revised No-Build

Vmean (mph)

robability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	2.734	3.773	3.008	2.362	2.951
15%	5.333	7.146	6.593	5.292	6.329
10%	6.322	8.044	7.570	6.106	7.254
5%	8.403	9.520	9.091	7.473	8.730
1%	11.388	12.420	12.516	10.139	11.777

Vgust (mph)

robability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	4.819	6.248	5.035	4.122	5.037
20%	8.500	10.198	9.251	7.608	8.951
15%	9.573	11.191	10.318	8.502	9.955
5%	12.887	14.583	13.949	11.513	13.378
1%	17.058	18.498	18.836	15.193	17.665

int Location # 25

Vmean (mph)

obability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	5.236	5.869	5.385	4.522	5.245
15%	10.560	11.100	10.577	9.190	10.386
10%	12.174	12.788	12.124	10.664	11.957
5%	14.766	15.530	14.678	12.966	14.556
1%	22.040	21.342	19.963	17.787	19.915

Vgust (mph)

obability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	8.149	9.344	8.366	7.013	8.137
20%	13.567	14.774	13.916	11.867	13.617
15%	15.134	16.275	15.427	13.226	15.090
5%	20.623	21.741	20.675	18.041	20.391
1%	27.616	29.243	27.552	24.278	27.396

Revised No-Build

```
Point Location #  26

          Vmean (mph)

Probability         FALL      WINTER     SPRING     SUMMER     ANNUAL
-----------------------------------------------------------------------
     50%           4.544      5.454      4.747      3.715      4.573
     15%           8.941     10.498      9.754      7.365      9.192
     10%          10.481     12.168     11.369      8.579     10.760
      5%          13.137     14.966     14.063     10.772     13.469
      1%          18.858     20.566     19.725     15.924     19.130

          Vgust (mph)

Probability         FALL      WINTER     SPRING     SUMMER     ANNUAL
-----------------------------------------------------------------------
     50%           7.739      9.370      8.041      6.374      7.805
     20%          12.867     15.090     13.619     10.752     13.189
     15%          14.266     16.629     15.365     11.916     14.651
      5%          19.259     21.911     20.695     16.099     19.844
      1%          26.069     28.721     27.711     21.963     26.738




Point Location #  23

          Vmean (mph)

Probability         FALL      WINTER     SPRING     SUMMER     ANNUAL
-----------------------------------------------------------------------
     50%           4.514      5.303      4.808      3.780      4.566
     15%           9.332     10.525      9.726      7.443      9.273
     10%          10.856     12.120     11.234      8.570     10.775
      5%          13.405     14.640     13.681     10.419     13.228
      1%          19.189     19.481     18.642     14.253     18.359

          Vgust (mph)

Probability         FALL      WINTER     SPRING     SUMMER     ANNUAL
-----------------------------------------------------------------------
     50%           6.929      8.230      7.330      5.802      6.998
     20%          11.761     13.403     12.375      9.607     11.801
     15%          13.129     14.858     13.762     10.537     13.158
      5%          18.263     20.017     18.755     14.341     18.139
      1%          25.861     26.374     25.280     19.471     24.867
```

oint Location # 23 Revised No Build

Vmean (mph)

robability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	4.599	5.463	4.835	3.904	4.662
15%	9.007	10.264	9.529	7.361	9.052
10%	10.367	11.695	10.891	8.348	10.415
5%	12.588	13.972	13.134	9.344	12.631
1%	17.588	18.650	17.844	13.643	17.402

Vgust (mph)

robability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	7.114	8.536	7.473	6.035	7.226
20%	11.939	13.702	12.601	9.895	12.049
15%	13.265	15.075	13.973	10.911	13.388
5%	17.920	19.873	18.802	14.456	18.048
1%	24.510	25.930	24.939	19.145	24.293

int Location # 35

Vmean (mph)

robability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	4.681	5.292	4.872	3.799	4.825
15%	9.796	11.921	10.690	7.887	10.183
10%	11.215	13.437	12.316	9.045	11.704
5%	13.459	15.747	14.807	10.923	14.054
1%	17.988	20.331	19.725	14.877	18.837

Vgust (mph)

obability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	7.229	9.311	7.548	5.914	7.392
20%	12.754	15.497	13.635	10.298	13.095
15%	14.255	17.121	15.338	11.493	14.689
5%	19.481	22.651	21.155	15.697	20.212
1%	26.112	29.227	28.220	21.339	27.286

Statistical Data for Amended Proposed Project

Amend Proposed

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          Vmean (mph)

oint Location #    4

robability         FALL      WINTER      SPRING      SUMMER      ANNUAL
------------------------------------------------------------------------
     50%          4.500       4.545       4.337       4.158       4.332
     15%         11.084      10.708      10.572      10.246      10.250
     10%         13.203      12.881      12.701      12.056      12.706
      5%         16.514      16.514      16.004      14.893      15.957
      1%         22.992      24.278      22.565      20.444      22.640

          Vgust (mph)

robability         FALL      WINTER      SPRING      SUMMER      ANNUAL
------------------------------------------------------------------------
     50%          7.618       8.064       7.563       6.803       7.521
     20%         13.619      13.932      13.928      12.405      13.431
     15%         15.651      15.674      15.298      13.994      15.157
      5%         22.229      22.207      21.603      19.656      21.439
      1%         30.523      31.793      29.661      25.619      29.772
```

```
oint Location #    5

          Vmean (mph)

robability         FALL      WINTER      SPRING      SUMMER      ANNUAL
------------------------------------------------------------------------
     50%          4.261       5.175       4.034       3.602       4.204
     15%          8.378       9.551       8.821       7.448       8.605
     10%          9.480      10.617       9.986       8.437       9.711
      5%         11.159      12.248      11.734       9.931      11.420
      1%         14.744      15.772      15.323      13.081      14.890

          Vgust (mph)

robability         FALL      WINTER      SPRING      SUMMER      ANNUAL
------------------------------------------------------------------------
     50%          6.748       8.372       6.839       5.847       6.893
     20%         11.933      13.883      12.559      10.383      12.236
     15%         13.259      15.225      13.994      11.542      13.534
      5%         17.551      19.564      18.635      15.334      17.974
      1%         22.778      24.851      23.940      19.937      23.297
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421

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      Line 76   Col 1   Insert    Indent  C:CA10_233.29
Point Location #  10

            Vmean (mph)

Probability          FALL    WINTER    SPRING    SUMMER    ANNUAL
-------------------------------------------------------------------
      50%           3.687     4.566     3.895     2.697     3.720
      15%           8.423    10.571     9.128     6.353     8.672
      10%          10.109    12.480    11.033     7.604    10.476
       5%          12.974    15.477    14.181     9.860    13.473
       1%          18.568    21.146    20.326    14.949    19.429


            Vgust (mph)

Probability          FALL    WINTER    SPRING    SUMMER    ANNUAL
-------------------------------------------------------------------
      50%           5.532     8.270     6.833     5.223     6.599
      20%          11.938    14.915    12.859     9.421    12.312
      15%          13.563    16.758    14.709    10.663    14.725
       5%          19.226    22.836    21.133    15.326    20.136
       1%          26.229    29.795    28.700    21.485    27.485
```

Amended Proposed

Point Location # 9

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	3.062	3.808	3.089	2.794	3.180
15%	6.134	7.066	6.481	5.675	6.388
10%	7.032	7.930	7.429	6.440	7.250
5%	8.429	9.231	8.835	7.609	8.625
1%	11.116	11.939	11.930	9.876	11.394

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	5.554	6.865	5.635	4.909	5.712
20%	9.532	11.044	9.923	8.538	9.737
15%	10.542	12.084	11.042	9.447	10.832
5%	13.871	15.482	14.733	12.407	14.280
1%	17.944	19.521	19.364	15.890	18.489

Point Location # 10

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	3.937	6.038	4.012	3.207	4.146
15%	11.081	14.411	12.518	9.182	11.934
10%	12.949	16.314	14.706	10.863	13.937
5%	15.673	19.078	17.878	13.334	16.885
1%	20.628	24.200	23.721	17.673	22.398

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	6.623	9.601	6.635	5.454	6.885
20%	14.351	18.780	15.923	11.859	15.316
15%	16.338	20.899	18.363	13.639	17.514
5%	22.745	27.487	25.831	19.289	24.409
1%	29.747	34.789	34.035	25.686	32.130

Amended Proposa

Point Location # 15

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	3.808	4.257	3.823	3.295	3.784
15%	7.799	8.345	7.811	6.865	7.733
10%	9.005	9.575	8.995	7.969	8.916
5%	10.371	11.560	10.911	9.752	10.836
1%	14.962	15.892	14.813	13.202	14.816

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	6.139	6.960	6.208	5.263	6.113
20%	10.484	11.640	10.680	8.939	10.477
15%	11.681	12.903	11.913	10.056	11.688
5%	15.750	17.168	16.085	13.650	15.795
1%	20.719	22.348	21.036	17.889	20.800

Point Location # 16

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	2.925	3.559	3.082	2.494	2.978
15%	5.421	6.010	5.645	4.543	5.462
10%	6.098	6.708	6.350	5.036	6.101
5%	7.347	7.714	7.470	5.928	7.198
1%	10.728	9.742	9.730	7.772	9.598

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	5.046	6.170	5.293	4.210	5.127
20%	8.385	9.716	8.792	6.922	8.513
15%	9.286	10.522	9.749	7.675	9.420
5%	12.481	13.624	12.975	10.148	12.535
1%	16.959	17.310	16.932	13.298	16.537

Amended Proposed

Vmean (mph)

oint Location # 17

obability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	5.983	7.225	6.159	5.148	6.031
15%	12.673	14.254	13.100	11.120	12.840
10%	14.412	15.938	14.886	12.683	14.595
5%	17.052	18.706	17.615	15.032	17.260
1%	22.378	24.135	22.887	19.727	22.579

Vgust (mph)

obability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	8.836	10.475	9.052	7.615	8.954
20%	15.323	17.271	15.650	13.528	15.550
15%	16.932	18.971	17.595	15.049	17.243
5%	22.655	24.649	23.317	20.155	22.871
1%	29.730	31.926	30.260	26.372	29.878

Point Location # 18

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	2.329	2.735	2.469	1.925	2.358
15%	4.459	4.928	4.737	3.788	4.536
10%	5.054	5.613	5.386	4.380	5.138
5%	6.187	6.660	6.424	5.363	6.203
1%	8.745	9.123	8.721	7.580	8.622

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	4.139	4.872	4.368	3.515	4.193
20%	6.766	7.661	7.248	5.800	6.898
15%	7.523	8.391	7.975	6.446	7.653
5%	10.148	10.920	10.604	8.761	10.234
1%	14.038	14.850	14.076	12.282	13.699

Amended Proposed

Point Location # 19

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	3.966	4.547	4.258	3.314	3.975
15%	8.349	8.949	8.643	6.767	8.221
10%	9.737	10.321	9.958	7.893	9.561
5%	12.246	12.552	12.146	9.826	11.798
1%	17.790	17.619	16.754	13.950	16.729

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	6.615	7.606	6.998	5.509	6.629
20%	11.315	12.531	11.816	9.336	11.295
15%	12.650	13.825	13.109	10.404	12.587
5%	17.578	18.351	17.593	14.231	17.126
1%	24.751	24.506	23.292	19.442	23.316

Point Location # 21

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	3.574	4.325	3.742	2.913	3.605
15%	7.038	8.296	7.542	5.659	7.245
10%	8.111	9.425	8.661	6.738	8.349
5%	9.831	11.145	10.443	8.280	10.855
1%	13.331	14.625	13.989	11.340	13.617

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	6.068	7.263	6.319	5.043	6.127
20%	10.182	11.784	10.730	8.568	10.368
15%	11.325	12.989	11.916	9.547	11.540
5%	15.329	17.166	16.080	12.995	15.828
1%	20.427	22.304	21.364	17.486	20.782

Amended Proposed

Point Location # 22

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	2.647	2.832	2.750	2.308	2.646
15%	4.685	4.848	4.760	3.967	4.612
10%	5.280	5.424	5.305	4.521	5.109
5%	6.347	6.237	6.121	5.253	5.981
1%	9.401	8.351	7.931	6.873	8.135

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	4.678	5.158	4.879	4.052	4.681
20%	7.410	7.808	7.603	6.395	7.323
15%	8.137	8.511	8.298	6.965	7.985
5%	10.935	10.869	10.661	9.042	10.465
1%	16.038	14.134	13.622	11.763	12.895

Point Location # 23

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	4.075	5.070	4.286	3.237	4.094
15%	9.421	11.583	10.080	7.141	9.608
10%	11.223	13.619	12.083	8.497	11.513
5%	14.266	16.828	15.434	10.841	14.693
1%	20.440	22.938	22.060	16.241	21.096

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	7.181	8.908	7.464	5.771	7.221
20%	13.183	16.148	14.008	10.457	13.464
15%	14.906	18.123	15.964	11.803	15.306
5%	20.943	24.623	22.762	16.701	21.768
1%	28.576	32.131	30.929	23.158	29.693

Amended Propose

```
          Vmean (mph)

Point Location #  24

Probability          FALL  - WINTER    SPRING    SUMMER    ANNUAL
---------------------------------------------------------------------
     50%            3.778     4.450     4.039     3.177     3.829
     15%            7.866     8.815     8.298     6.525     7.907
     10%            9.323    10.133     9.701     7.638     9.274
      5%           11.939    12.235    11.973     9.531    11.572
      1%           13.856    17.544    16.905    13.839    17.134

          Vgust (mph)

Probability          FALL    WINTER    SPRING    SUMMER    ANNUAL
---------------------------------------------------------------------
     50%            6.376     7.423     6.735     5.417     6.445
     20%           10.832    12.197    11.293     9.036    10.882
     15%           12.120    13.512    12.598    10.141    12.149
      5%           17.088    17.943    17.180    13.822    16.707
      1%           26.255    23.867    23.038    18.750    23.182
```

```
          Vmean (mph)

Point Location #  25

Probability          FALL    WINTER    SPRING    SUMMER    ANNUAL
---------------------------------------------------------------------
     50%            4.472     5.521     4.545     3.962     4.594
     15%            8.775    10.605     9.288     7.882     9.163
     10%           10.010    11.931    10.802     8.981    10.544
      5%           12.028    14.188    13.322    10.775    12.738
      1%           16.305    18.495    16.684    14.478    17.355

          Vgust (mph)

Probability          FALL    WINTER    SPRING    SUMMER    ANNUAL
---------------------------------------------------------------------
     50%            7.152     8.657     7.282     6.310     7.305
     20%           12.032    14.323    12.528    10.755    12.434
     15%           13.393    15.842    14.037    11.937    13.651
      5%           18.012    20.912    19.665    15.983    18.861
      1%           23.831    26.861    27.054    21.035    25.263
```

Amended Proposed

```
    Line 54   Col 1   Insert    Indent  C:CA05_26F.3P
int Location #  26

         Vmean (mph)

obability         FALL      WINTER      SPRING      SUMMER      ANNUAL
-------------------------------------------------------------------------
    50%          4.072       5.202       4.094       3.605       4.213
    15%          8.378       9.601       8.833       7.428       8.614
    10%          9.467      10.670      10.003       8.400       9.718
     5%         11.116      12.303      11.824       9.874      11.424
     1%         14.657      15.742      15.385      12.344      14.873

         Vgust (mph)

obability         FALL      WINTER      SPRING      SUMMER      ANNUAL
-------------------------------------------------------------------------
    50%          6.797       8.463       6.868       5.870       6.937
    20%         12.033      14.042      12.668      10.432      12.342
    15%         13.361      15.403      14.123      11.581      13.639
     5%         17.617      19.747      18.783      15.317      18.035
     1%         22.787      24.930      24.153      19.847      23.425



         Vmean (mph)

int Location #    28

obability         FALL      WINTER      SPRING      SUMMER      ANNUAL
-------------------------------------------------------------------------
    50%          4.874       5.498       5.145       4.057       4.859
    15%          9.636      10.377       9.884       7.900       9.505
    10%         11.104      11.815      11.275       9.053      10.889
     5%         13.633      14.176      13.505      11.005      13.219
     1%         19.253      19.043      18.089      15.446      18.204

         Vgust (mph)

obability         FALL      WINTER      SPRING      SUMMER      ANNUAL
-------------------------------------------------------------------------
    50%          7.466       8.538       7.842       6.250       7.474
    20%         12.298      13.589      12.785      10.264      12.280
    15%         13.627      14.898      14.079      11.349      13.582
     5%         18.449      19.443      18.533      15.142      18.102
     1%         25.460      25.308      24.097      20.396      24.159

106_31f.2
```

Amended Proposed

Point Location # 29

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	5.429	6.247	5.679	4.658	5.479
15%	10.226	11.185	10.460	8.731	10.182
10%	11.574	12.516	11.743	9.617	11.486
5%	13.713	14.541	13.737	11.515	13.507
1%	18.801	18.530	17.697	14.823	17.702

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	8.030	9.395	8.372	6.884	8.127
20%	13.157	14.707	13.571	11.276	13.218
15%	14.511	16.058	14.901	12.414	14.552
5%	19.031	20.562	19.403	16.123	18.978
1%	25.605	25.877	24.870	22.570	24.614

Point Location # 35

Vmean (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	2.903	3.924	3.123	2.463	3.053
15%	6.581	8.290	7.309	5.288	6.872
10%	7.887	9.843	8.814	6.219	8.284
5%	10.316	12.384	11.445	7.978	10.773
1%	15.322	17.280	16.674	12.328	15.861

Vgust (mph)

Probability	FALL	WINTER	SPRING	SUMMER	ANNUAL
50%	5.235	7.061	5.624	4.485	5.544
20%	9.873	12.364	10.826	8.162	10.323
15%	11.198	13.912	12.356	9.185	11.731
5%	16.268	19.518	18.020	13.065	17.097
1%	22.981	26.203	25.260	18.852	24.081

Seasonal and Annual Statistical Data for Mitigation and Raw Wind Tunnel Data

Trans only Boylston
+ GCC Washington

```
oint Location #  17

         Vmean (mph)

robability         FALL     WINTER     SPRING     SUMMER     ANNUAL
-------------------------------------------------------------------
     5.083    6.065     5.131     4.214     5.070
    10.830   12.523    11.268     9.385    11.037
    12.311   14.066    12.859    10.718    12.596
    14.556   16.424    15.288    12.748    14.914
    18.915   20.912    19.938    16.730    19.498

         Vgust (mph)

robability         FALL     WINTER     SPRING     SUMMER     ANNUAL
-------------------------------------------------------------------
     7.644    8.991     7.762     6.428     7.661
    13.417   15.407    13.781    11.613    13.592
    14.894   16.993    15.383    12.964    15.133
    19.747   22.113    20.636    17.456    20.206
    25.600   28.166    26.862    22.796    26.284

ress (RET) For More, (ESC) To Exit

:\COMCNTR>
```

```
oint Location #   4

         Vmean (mph)

robability         FALL     WINTER     SPRING     SUMMER     ANNUAL
-------------------------------------------------------------------
     5.325    5.736     5.333     4.638     5.249
    10.394   10.721    10.376     9.215    10.130
    11.859   12.151    11.812    10.552    11.630
    14.272   14.537    14.124    12.681    13.935
    19.379   20.370    19.026    17.073    19.030

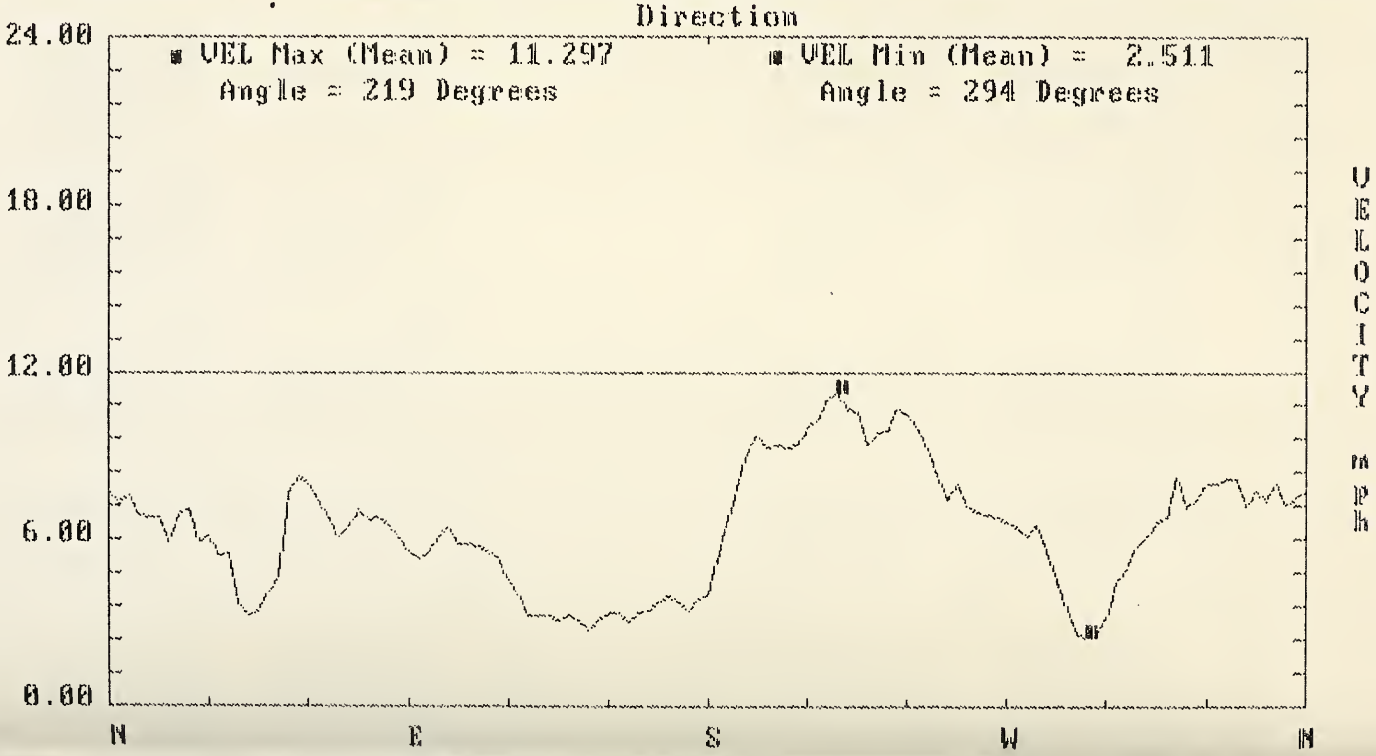
         Vgust (mph)

obability          FALL     WINTER     SPRING     SUMMER     ANNUAL
-------------------------------------------------------------------
     7.898    8.713     8.028     6.784     7.836
    13.015   13.841    13.186    11.318    12.872
    14.416   15.193    14.562    12.541    14.225
    19.221   19.924    19.193    16.745    18.872
    25.547   26.609    25.035    22.030    24.934

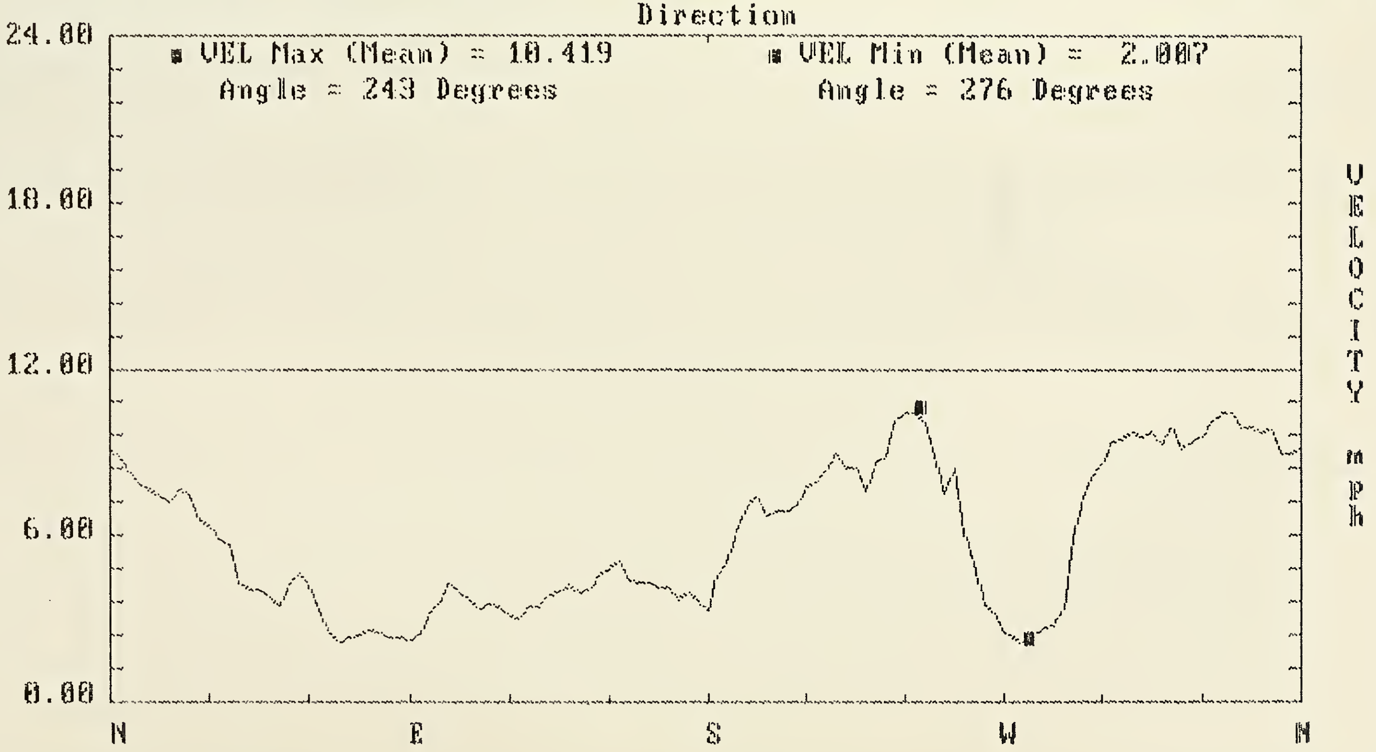
ess (RET) For More, (ESC) To Exit

\COMCNTR>
```

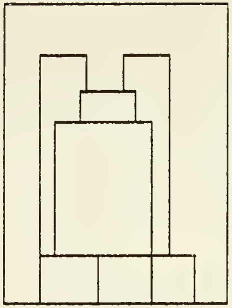
Location # 4 Commonwealth Center Mitigation "4" ccw m417_04b.2

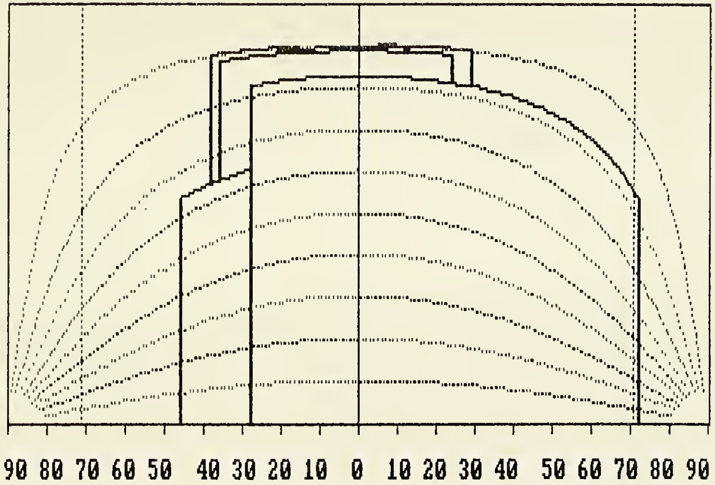


Location #17 Commonwealth Center Mitigation "4" ccw m417_04b.1



Daylight





Boston
Redevelopment
Authority
Daylighting
Analysis

Daylight obstruction 71.0 %
Commonwealth Center FPIR/FEIR

run code 1h7V

```
PROJECT DATA
------- ----

PROJECT NAME :  Commonwealth Center FPIR/FEIR

BUILDING LOCATION :  Avery Street-Keith Block-Point #10

ARCHITECT / DEVELOPER :  KPF/CCLP

DATE :  January 8, 1990

COMMENTS :  Revised Keith Block North Tower Impact


SITE CHARACTERISTICS
---- ---------------

Width of street :  25

Distance from street edge to front property line :  10

Width of property :  136


BUILDING CHARACTERISTICS
-------- ---------------

LAYER 1

     Distance back from front property line :  0

                                                 LAYER COORDINATES
         FROM          DIRECTION    DISTANCE    HORIZ(X)  VERT(Y)        IS NOW
     --------------    ---------    --------    -----------------     -----------
     left prop line      right         55          56        -             -
         ground           up            0          56        0         corner  1
       corner  1          up           80          56       80         corner  2
       corner  2         right         80         136       80         corner  3
       corner  3         down          80         136        0        end of layer

LAYER 2

     Distance back from layer 1 :  28

                                                 LAYER COORDINATES
         FROM          DIRECTION    DISTANCE    HORIZ(X)  VERT(Y)        IS NOW
     --------------    ---------    --------    -----------------     -----------
     left prop line      right         16          16        -             -
         ground           up            0          16        0         corner  1
       corner  1          up           80          16       80         corner  2
       corner  2         right         40          56       80         corner  3
       corner  3         down          80          56        0        end of layer


                                                                    run code 1h7V2
```

```
LAYER 3

     Distance back from layer 1 :  6

                                                    LAYER COORDINATES
        FROM          DIRECTION   DISTANCE      HORIZ(X)  VERT(Y)         IS NOW
   --------------     ---------   --------      -----------------      ------------
   left prop line       right        26            26        -               -
       ground            up          80            26        80          corner  1
     corner  1           up         234            26       314          corner  2
     corner  2          right        68            94       314          corner  3
     corner  3          down        234            94        80          corner  4
     corner  4          right        42           136        80          corner  5
     corner  5          down         80           136         0         end of layer

LAYER 4

     Distance back from layer 1 :  4

                                                    LAYER COORDINATES
        FROM          DIRECTION   DISTANCE      HORIZ(X)  VERT(Y)         IS NOW
   --------------     ---------   --------      -----------------      ------------
   left prop line       right        44            44        -               -
       ground            up         314            44       314          corner  1
     corner  1           up          50            44       364          corner  2
     corner  2          right        38            82       364          corner  3
     corner  3          down         50            82       314          corner  4
     corner  4          right        12            94       314          corner  5
     corner  5          down        314            94         0          corner  6
     corner  6          right        42           136         0         end of layer

LAYER 5

     Distance back from layer 1 :  6

                                                    LAYER COORDINATES
        FROM          DIRECTION   DISTANCE      HORIZ(X)  VERT(Y)         IS NOW
   --------------     ---------   --------      -----------------      ------------
   left prop line       right        16            16        -               -
       ground            up          80            16        80          corner  1
     corner  1           up         346            16       426          corner  2
     corner  2          right        32            48       426          corner  3
     corner  3          down         62            48       364          corner  4
     corner  4          right        26            74       364          corner  5
     corner  5           up          62            74       426          corner  6
     corner  6          right        32           106       426          corner  7
     corner  7          down        346           106        80          corner  8
     corner  8          right        18           124        80          corner  9
     corner  9          down         80           124         0         end of layer


                                                                        run code 1h7V2
```

```
Reflectance
-----------

     REGION 1 :                SURFACE         AREA          REFLECTANCE
                               -------         -----         -----------
                                  1            1000             35 %

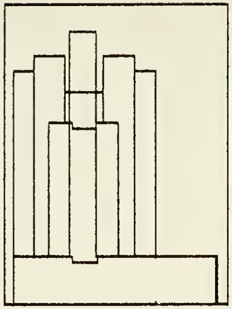
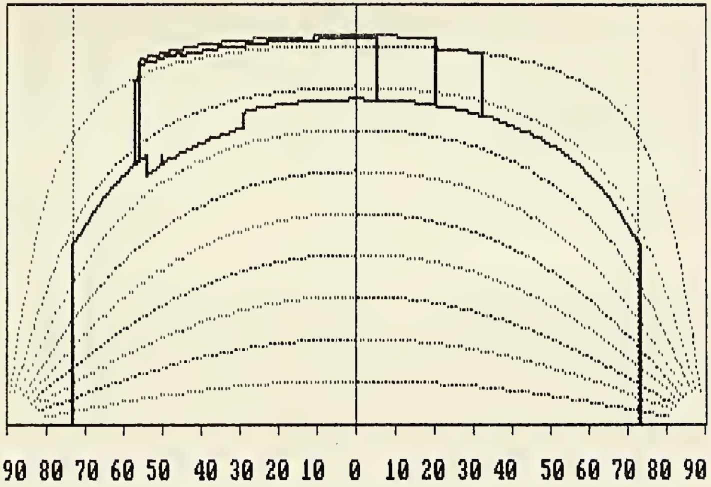
Overall building reflectance   35 %
---------------------------------------------------------------------------

Unadjusted daylight obstruction  71.0 %

Reflectance adjusted daylight obstruction  71.0 %




                                                              run code 1h7V2
```



Boston
Redevelopment
Authority
Daylighting
Analysis

Daylight obstruction 86.4 % run code 9M6S

Commonwealth Center FPIR/FEIR

```
PROJECT DATA
------- ----

PROJECT NAME :  Commonwealth Center FPIR/FEIR

BUILDING LOCATION :  Washington Street-Keith Block-Point #13

ARCHITECT / DEVELOPER :  KPF/CCLP

DATE :  January 8, 1990

COMMENTS :  Revised Keith Block North Tower Impact


SITE CHARACTERISTICS
---- ---------------

Width of street :  40

Distance from street edge to front property line :  10

Width of property :  198


BUILDING CHARACTERISTICS
-------- ---------------

LAYER 1

     Distance back from front property line :  0

                                                    LAYER COORDINATES
         FROM          DIRECTION    DISTANCE    HORIZ(X)  VERT(Y)        IS NOW
    --------------     ---------    --------    -----------------     -----------
    left prop line       right          0           0        -             -
        ground            up            0           0        0         corner  1
       corner  1          up           80           0       80         corner  2
       corner  2         right         57          57       80         corner  3
       corner  3         down          12          57       68         corner  4
       corner  4         right         25          82       68         corner  5
       corner  5          up           12          82       80         corner  6
       corner  6         right        116         198       80         corner  7
       corner  7         down          80         198        0        end of layer

LAYER 2

     Distance back from layer 1 :  12



                                                                     run code 9M832
```

```
                                                       LAYER COORDINATES
      FROM            DIRECTION     DISTANCE       HORIZ(X)  VERT(Y)          IS NOW
 --------------       ---------     --------       -----------------       ------------
 left prop line         right           0              0         -               -
     ground              up            80              0        80          corner  1
   corner  1            right          35             35        80          corner  2
   corner  2             up           234             35       314          corner  3
   corner  3            right          22             57       314          corner  4
   corner  4            down           12             57       302          corner  5
   corner  5            right          24             81       302          corner  6
   corner  6             up            12             81       314          corner  7
   corner  7            right          22            103       314          corner  8
   corner  8            down          234            103        80          corner  9
   corner  9            right          94            197        80          corner 10
   corner 10            down           80            197         0        end of layer

LAYER 3

     Distance back from layer 1 :  2

                                                       LAYER COORDINATES
      FROM            DIRECTION     DISTANCE       HORIZ(X   VERT(Y           IS NOW
 --------------       ---------     --------       -----------------       ------------
 left prop line         right          50             50         -               -
     ground              up           314             50       314          corner  1
   corner  1             up            50             50       364          corner  2
   corner  2            right          38             88       364          corner  3
   corner  3            down           50             88       314          corner  4
   corner  4            right          15            103       314          corner  5
   corner  5            down          234            103        80          corner  6
   corner  6            right          95            198        80          corner  7
   corner  7            down           80            198         0        end of layer

LAYER 4

     Distance back from layer 1 :  8

                                                       LAYER COORDINATE
      FROM            DIRECTION     DISTANCE       HORIZ(X)  VERT(Y)          IS NOW
 --------------       ---------     --------       -----------------       ------------
 left prop line         right          20             20         -               -
     ground              up            80             20        80          corner  1
   corner  1             up           346             20       426          corner  2
   corner  2            right          30             50       426          corner  3
   corner  3            down           62             50       364          corner  4
   corner  4            right          38             88       364          corner  5
   corner  5             up            62             88       426          corner  6
   corner  6            right          30            118       426          corner  7
   corner  7            down          346            118        80          corner  8
   corner  8            right          80            198        80          corner  9
   corner  9            down           80            198         0        end of layer


                                                                         run code 9M6S2
```

```
LAYER 5

     Distance back from layer 1 =   12

                                                  LAYER COORDINATES
         FROM          DIRECTION    DISTANCE     HORIZ(X)  VERT(Y)        IS NOW
     --------------    ---------    --------    ----------------       -----------
     left prop line      right          0           0         -             -
        ground            up           80           0        80        corner  1
       corner  1          up          321           0       401        corner  2
       corner  2         right         20          20       401        corner  3
       corner  3         down         321          20        80        corner  4
       corner  4         right         35          55        80        corner  5
       corner  5          up          385          55       465        corner  6
       corner  6         right         26          81       465        corner  7
       corner  7         down         385          81        80        corner  8
       corner  8         right         37         118        80        corner  9
       corner  9          up          321         118       401        corner 10
       corner 10         right         20         138       401        corner 11
       corner 11         down           0         138       401        corner 12
       corner 12         right          1         139       401        corner 13
       corner 13         down         401         139         0      end of layer


Reflectance
-----------

     REGION 1 :                SURFACE         AREA          REFLECTANCE
                               -------        ------         -----------
                                  1            1000             35 %

Overall building reflectance   35 %

---------------------------------------------------------------------------

Unadjusted daylight obstruction  86.4 %

Reflectance adjusted daylight obstruction  86.4 %



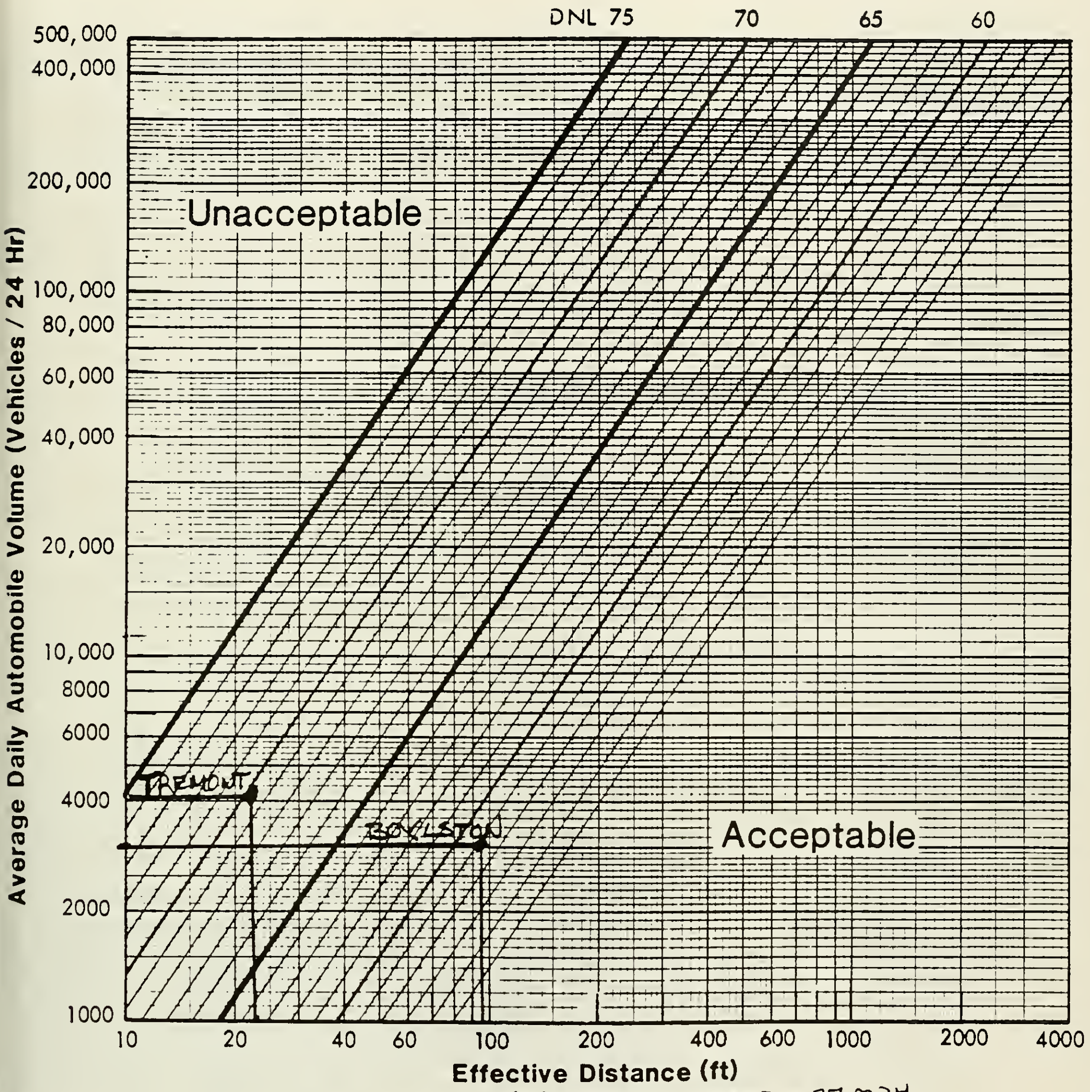

                                                               run code 9M6S2
```

Noise

1 of 51

EXISTING 1989
BOSTON COMMON

Workchart 1
Autos (55 mph)



AVG. TRAFFIC SPEED = 27 MPH
ADJ. FACTOR = 0.26

∴ TREMONT 15859A × .26 = 4,123
BOYLSTON 11587A × .26 = 3,013

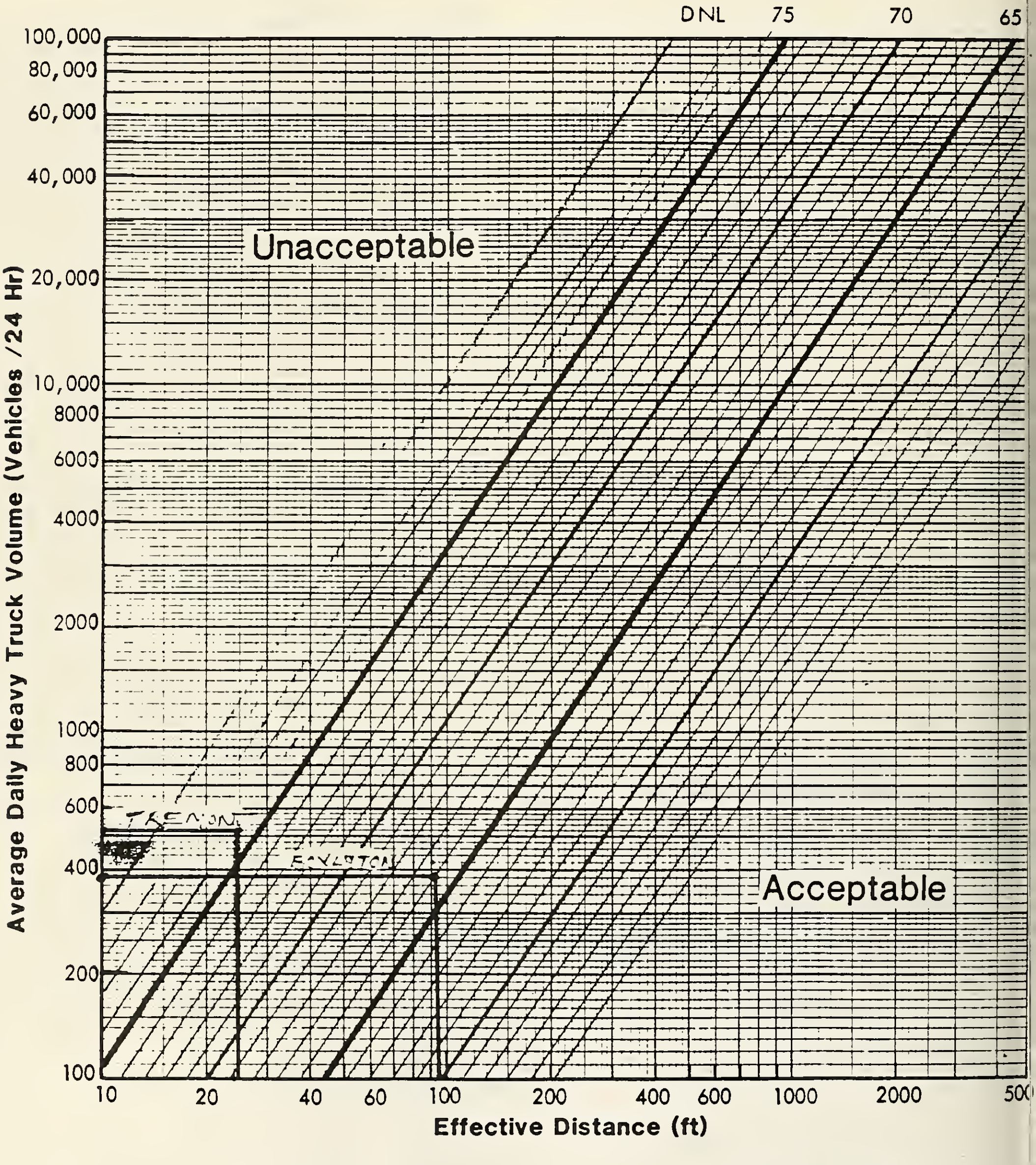
EXISTNG 1989
BOSTON COMMON

TREMONT ST. = 15,859 A
DISTANCE 24f
BOYLSTON ST = 11,587 A
DISTANCE = 96f

2 of 51

EXISTING 1989
BOSTON COMMON

Workchart 2
Heavy Trucks (55 mph)



EXISTING 1989
BOSTON COMMON
TREMONT ST = 660 HT
DISTANCE = 24 f

AVG TRAFFIC SPEED = 27 mpH
ADJ. FACTOR = 81

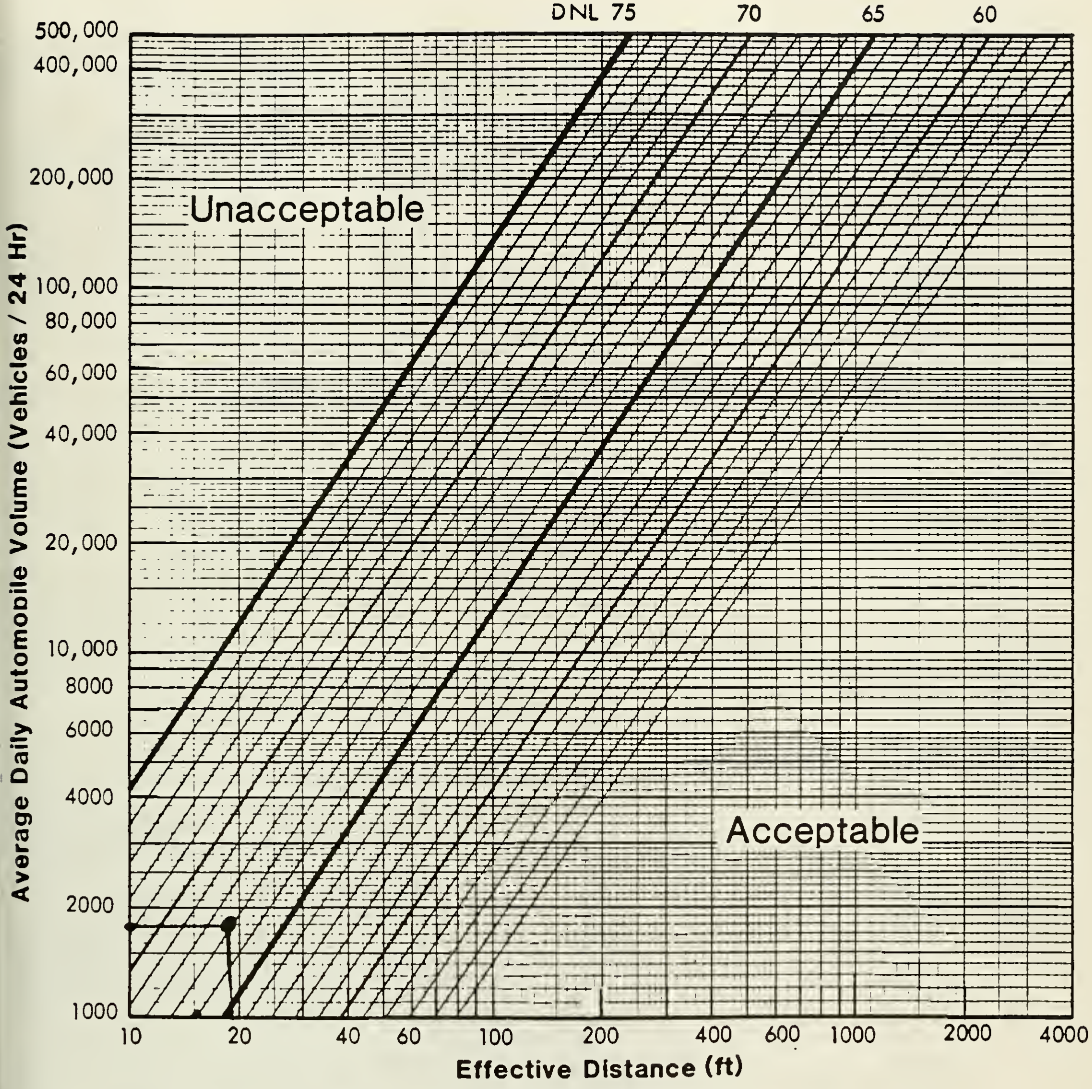
∴ TREMONT 660 HT × .81 = 535
BOYLSTON 483 HT × .81 = 391

3 of 51

EXISTING 1989

Workchart 1
Autos (55 mph)

CHINA TRADE CENTER



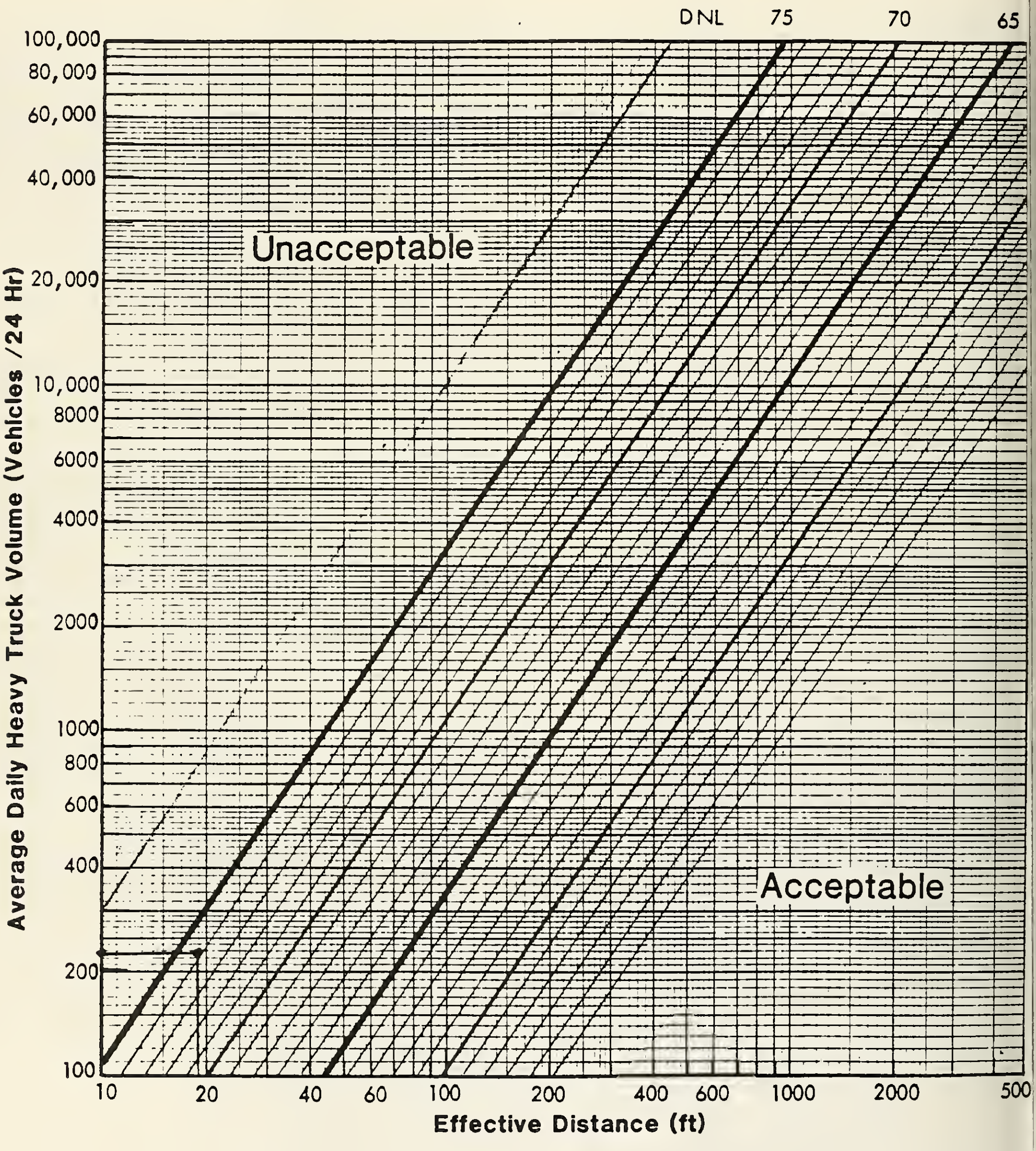
BOYLSTON ST = 6852 AUTO
DISTANCE = 19 f

AVG. TRAFFIC SPEED = 27 mpH
ADJ FACTOR = 0.26

∴ 6852 A × .26 = 1,781

EXISTING 1989
CHINA TRADE CENTER

Workchart 2
Heavy Trucks (55 mph)



BOYLSTON ST = 285 HEAVY TRUCKS
DISTANCE = 19f
AVG. SPEED = 27 mpH
∴ 285 HT × .81 = 231

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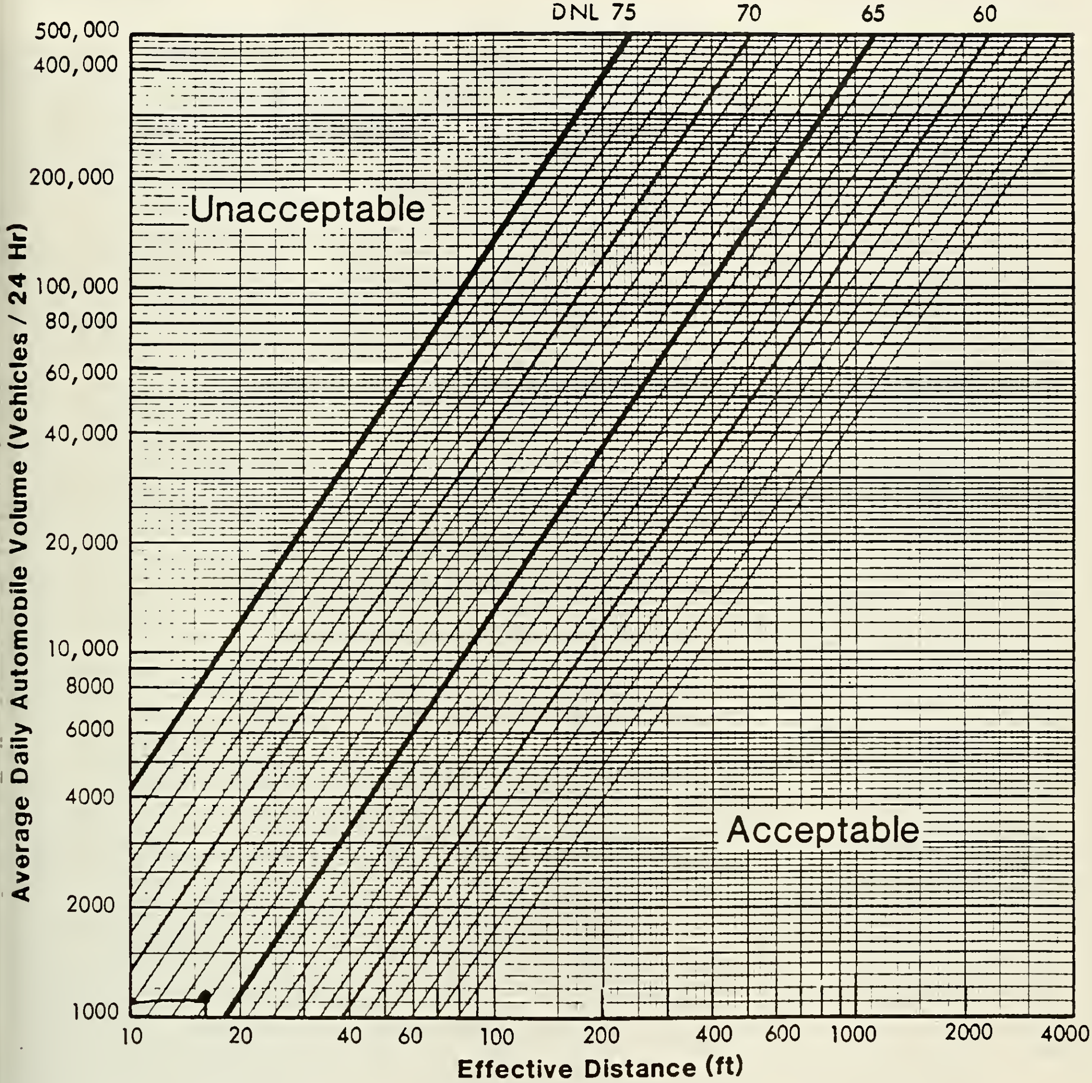
EXISTING 1989

RETAIL STORE

Workchart 1
Autos (55 mph)



WASHINGTON ST = 3,955 AUTOS
DISTANCE = 16 f
AVG TRAFFIC SPEED = 27 mph
ADJ FACTOR = 0.26
∴ 3,955A × 0.26 = 1028A

EXISTING 1989
RETAIL STORE

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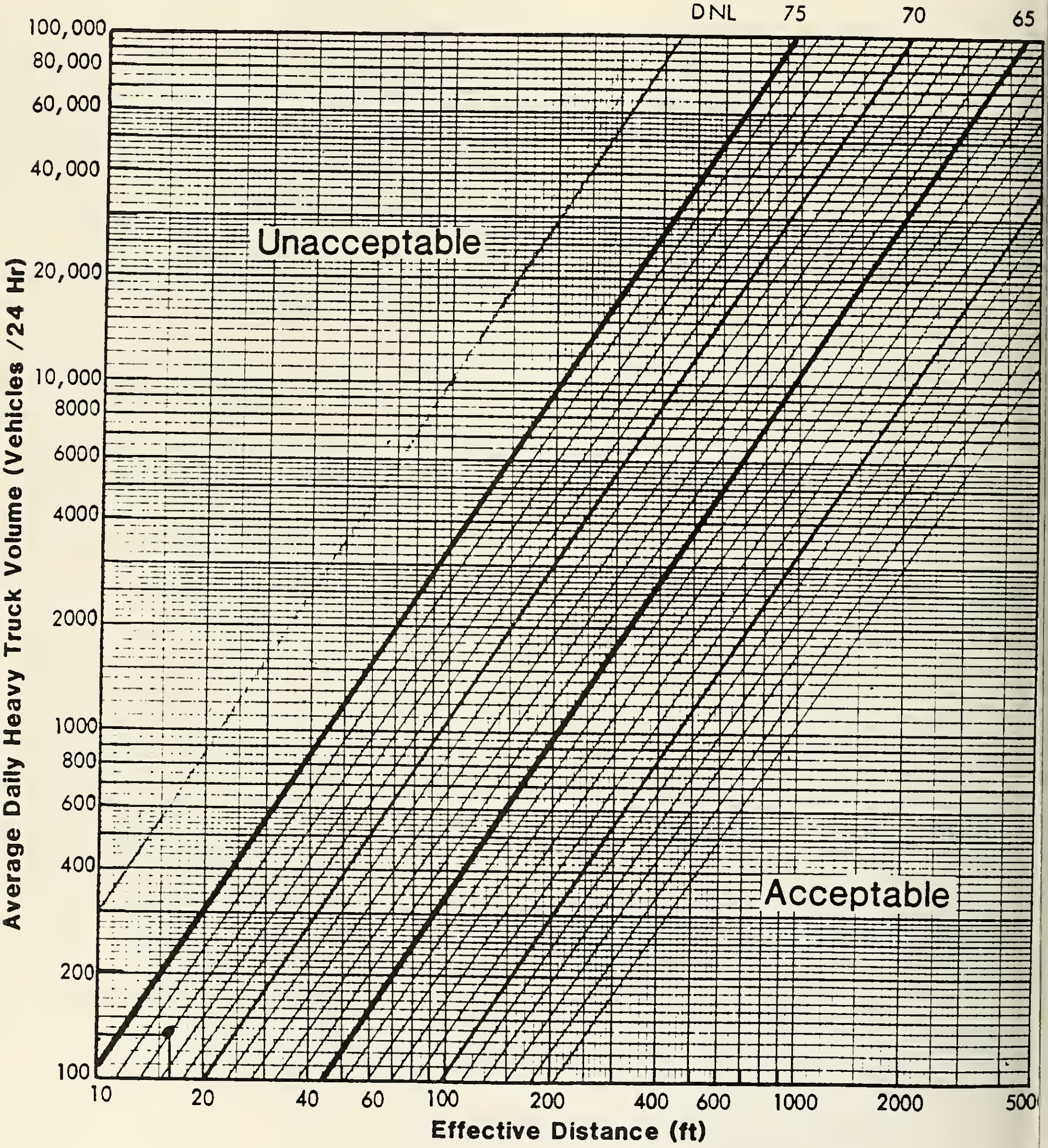
Workchart 2
Heavy Trucks (55 mph)



WASHINGTON ST = 165 HEAVY TRUCKS
DISTANCE = 16 f
SPEED LESS THAN 50 MPH = .81
∴ 165 HT × .81 = 134

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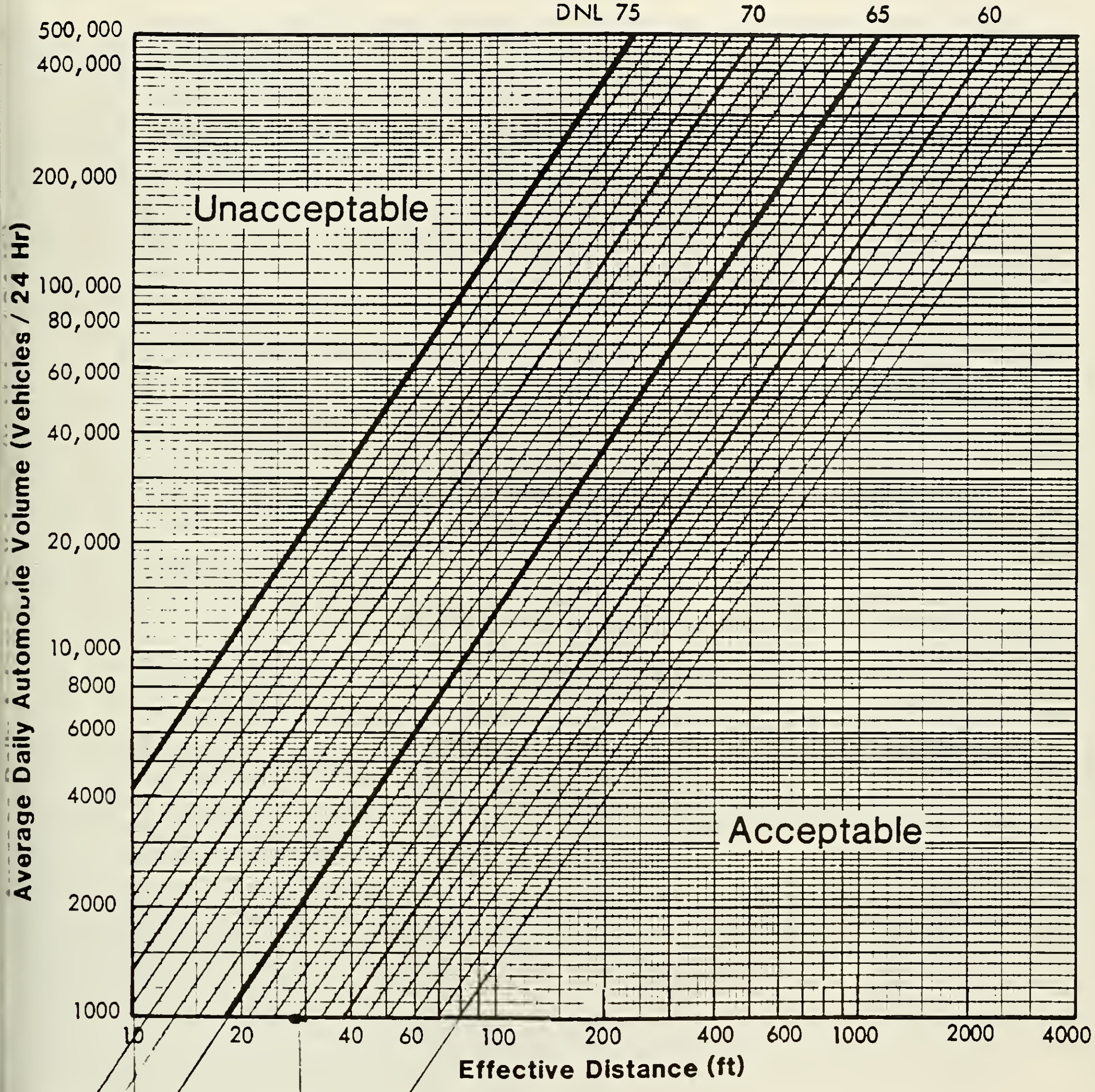
EXISTING 1989

Workchart 1
Autos (55 mph)

HOTEL ENTRANCE



AVERY ST = 788 AUTO
DISTANCE = 29 f

AVG TRAFFIC SPEED = 27 mph
~~ADJ~~ FACTOR = 0.26
∴ 788 $\overset{A}{\times}$ .26 = 205 A

EXISTING 1989

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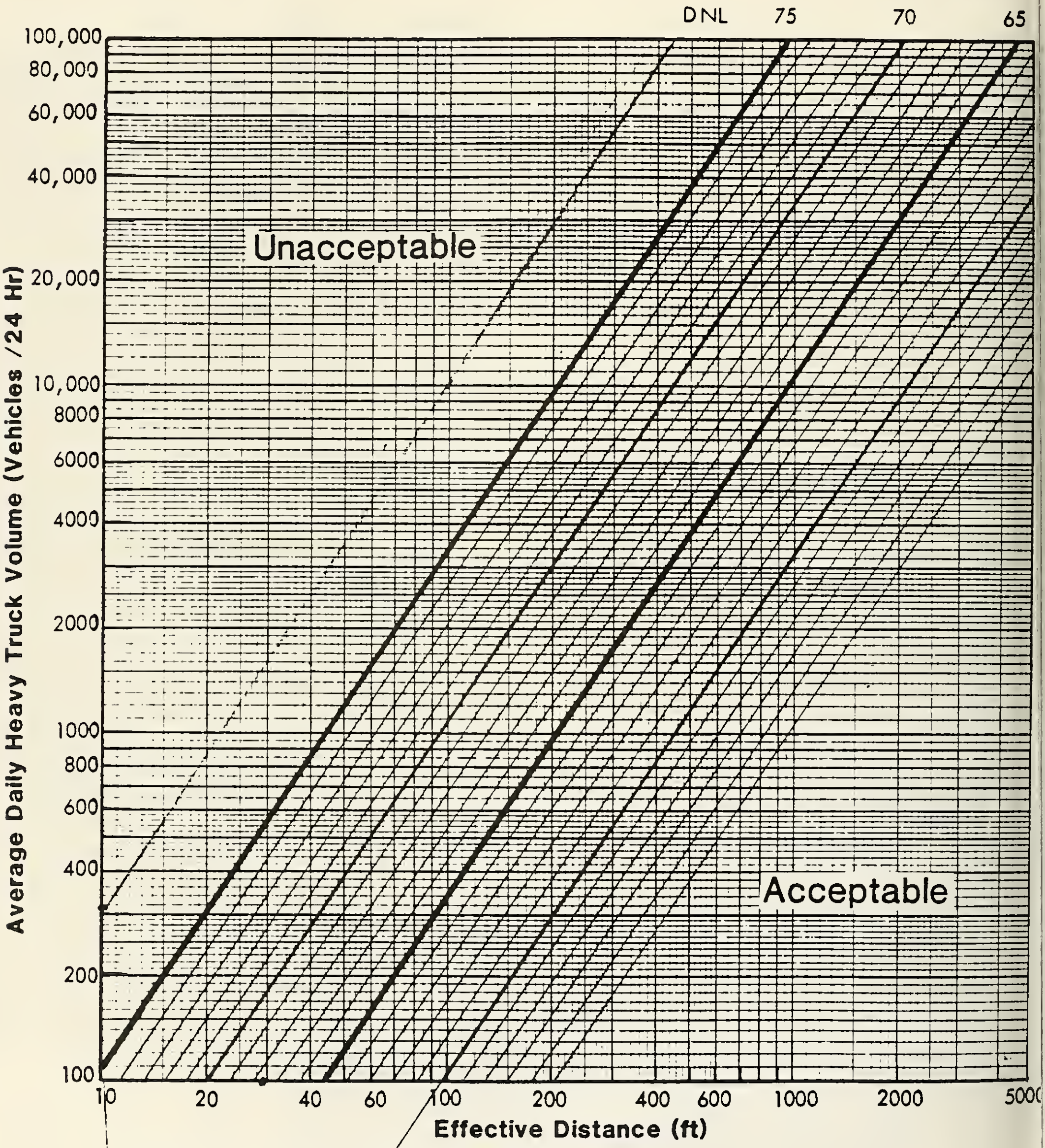
HOTEL ENTRANCE

Workchart 2
Heavy Trucks (55 mph)

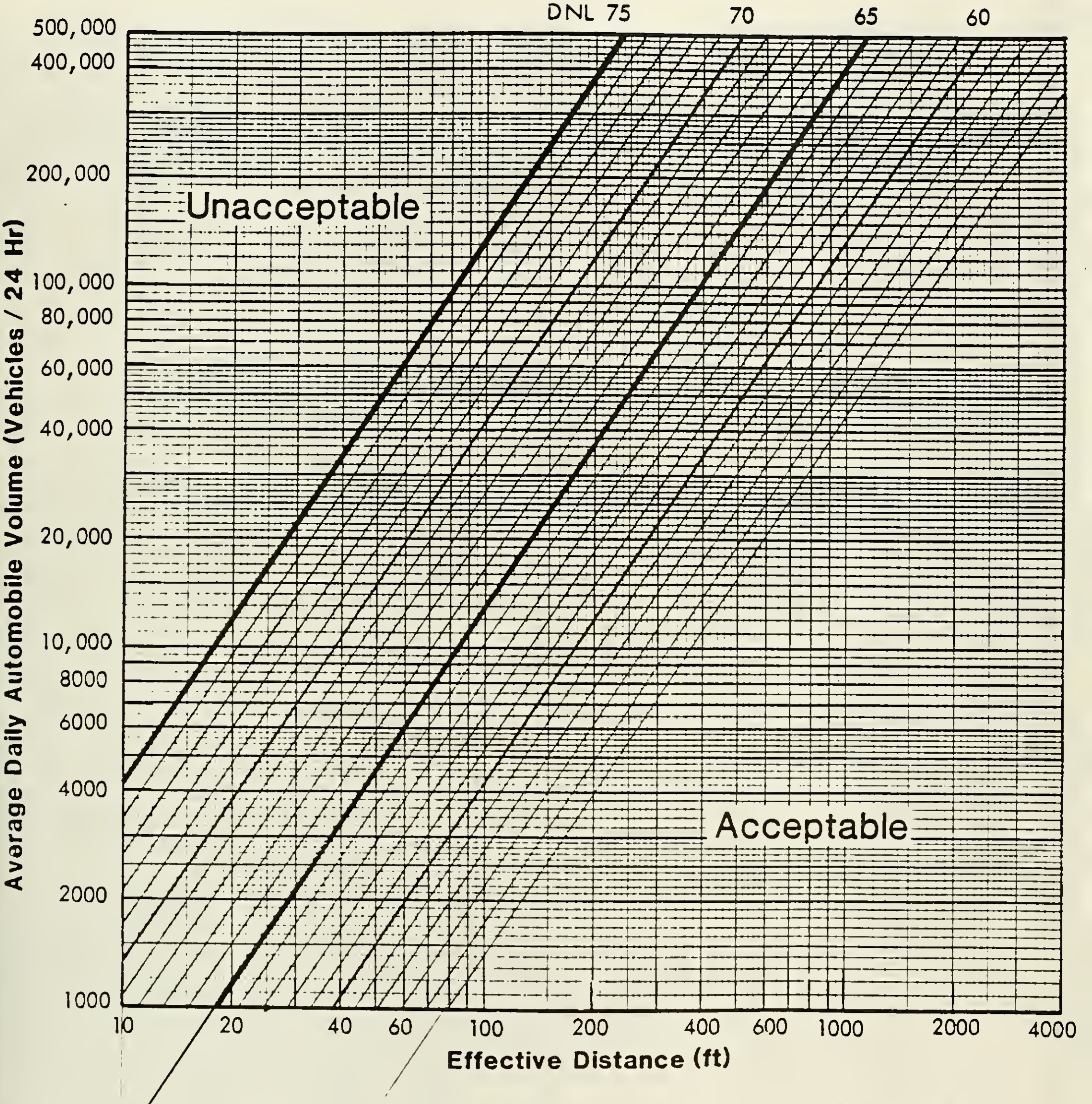


AVERY ST. = 32 HEAVY TRUCKS
DISTANCE = 29 f
SPEED LESS THAN 50 MPH = .81
∴ 32 HT × .81 = 26

EXISTING 1989 9 of 51

MASON PLACE

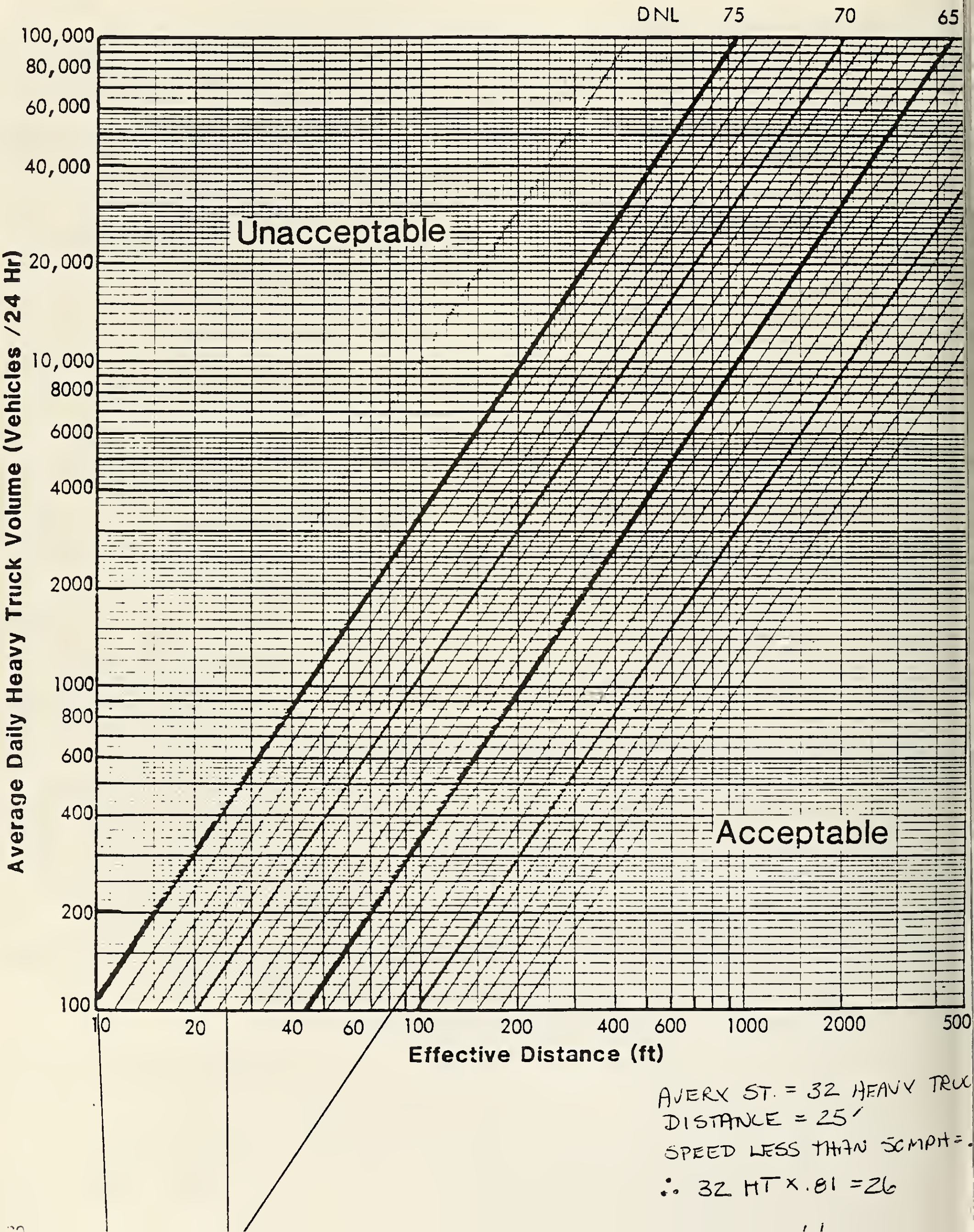
Workchart 1
Autos (55 mph)



AVERY ST = 788 AUTO
DISTANCE = 25'
AVG. TRAFFIC SPEED = 27 mph
ADJ FACTOR = 0.26
∴ 788A × 0.26 = 205A

EXISTING 1989 10 of 51
MASON PLACE

Workchart 2
Heavy Trucks (55 mph)

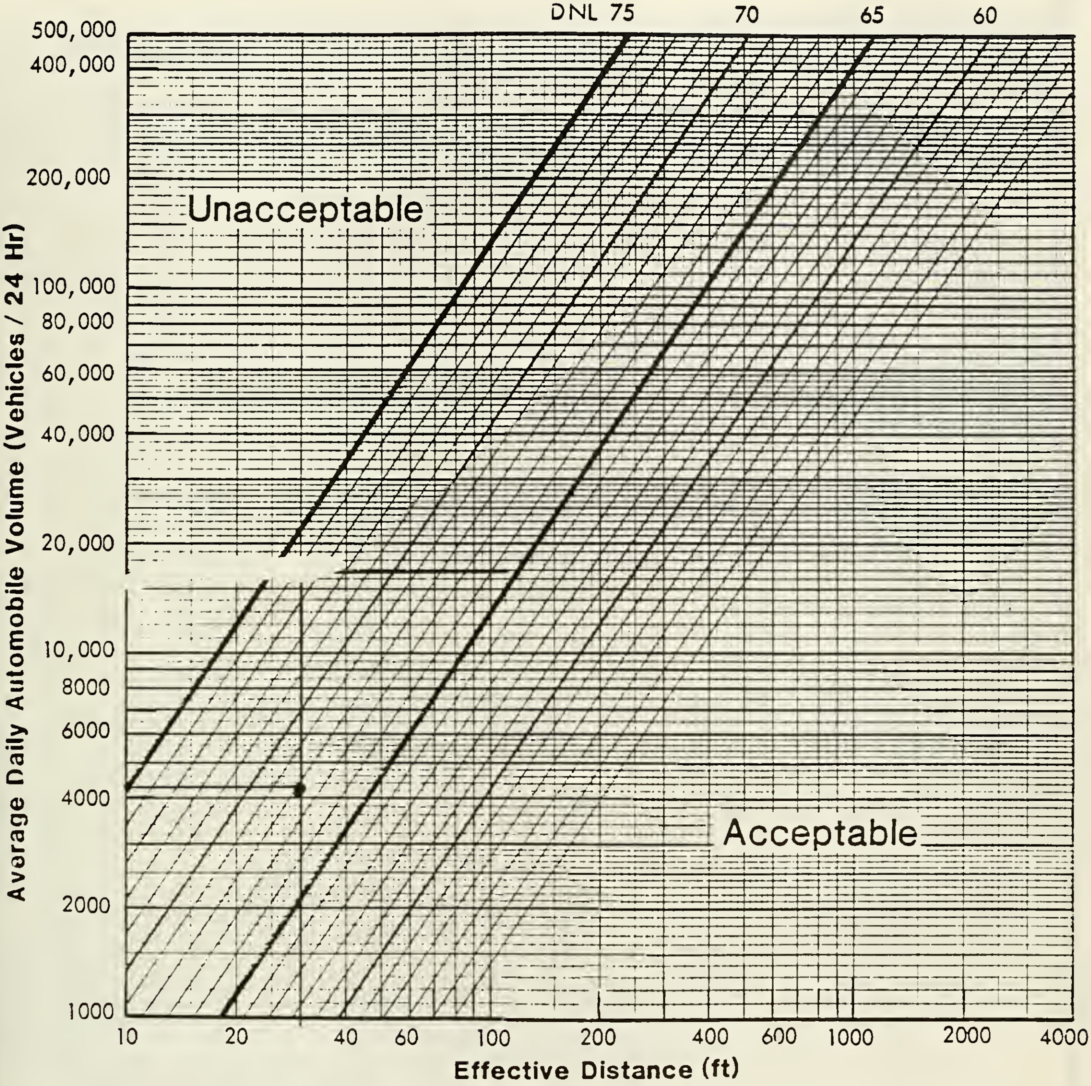


AVERY ST. = 32 HEAVY TRUC
DISTANCE = 25′
SPEED LESS THAN 50MPH =
∴ 32 HT × .81 = 26

EXISTING 1989

PARK PLACE WEST

Workchart 1
Autos (55 mph)



TREMONT ST. = 16589 AUTOS

DISTANCE = 30'

AVG. TRAFFIC SPEED = 27 MPH

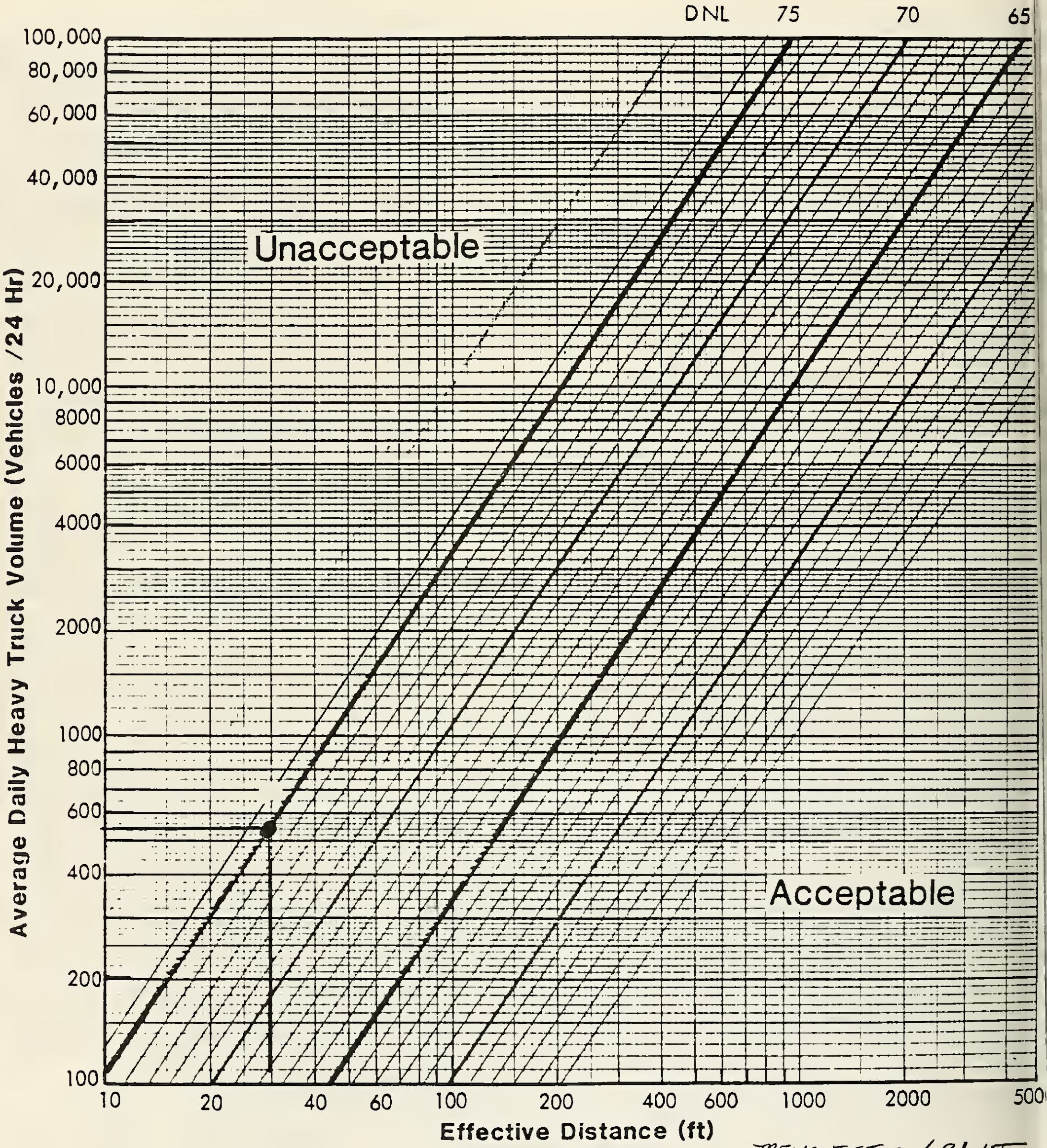
ADJ. FACTOR = 0.26

∴ 16589 x .26 = 4313 A

68

EXISTING 1989
PARK PLACE WEST

Workchart 2
Heavy Trucks (55 mph)



TREMONT ST = 691 HT
DISTANCE = 30′

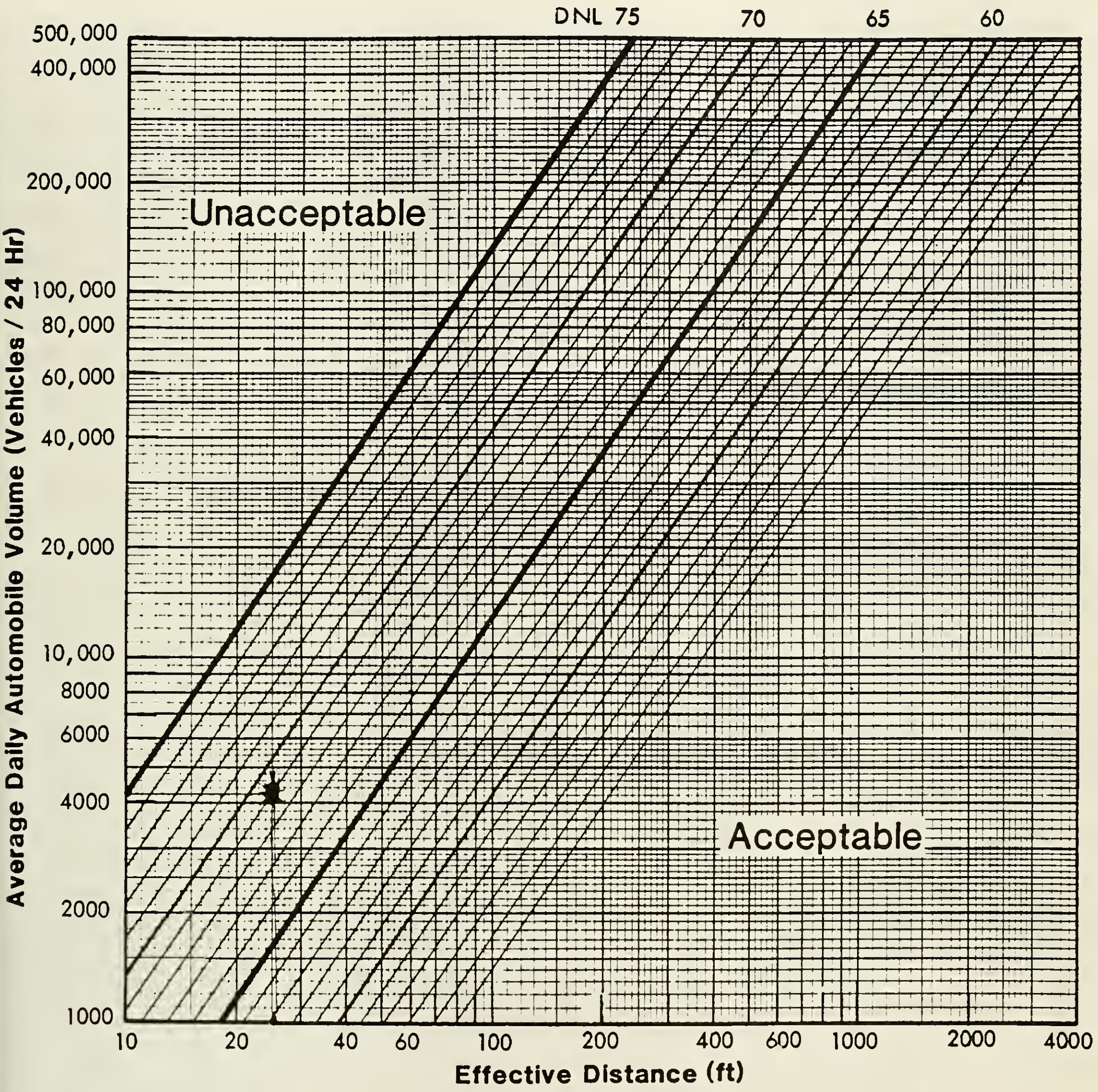
SPEED LESS THAN 50
MPH = .81

∴ 691 × .81 = 560 HT

EXISTING 1989 13 of 51

TREMONT ON THE COMMON

Workchart 1
Autos (55 mph)



TREMONT ST = 16589 AUTOS
DISTANCE = 30'
AVG. TRAFFIC SPEED = 27 mph
ADJ. FACTOR = 0.26

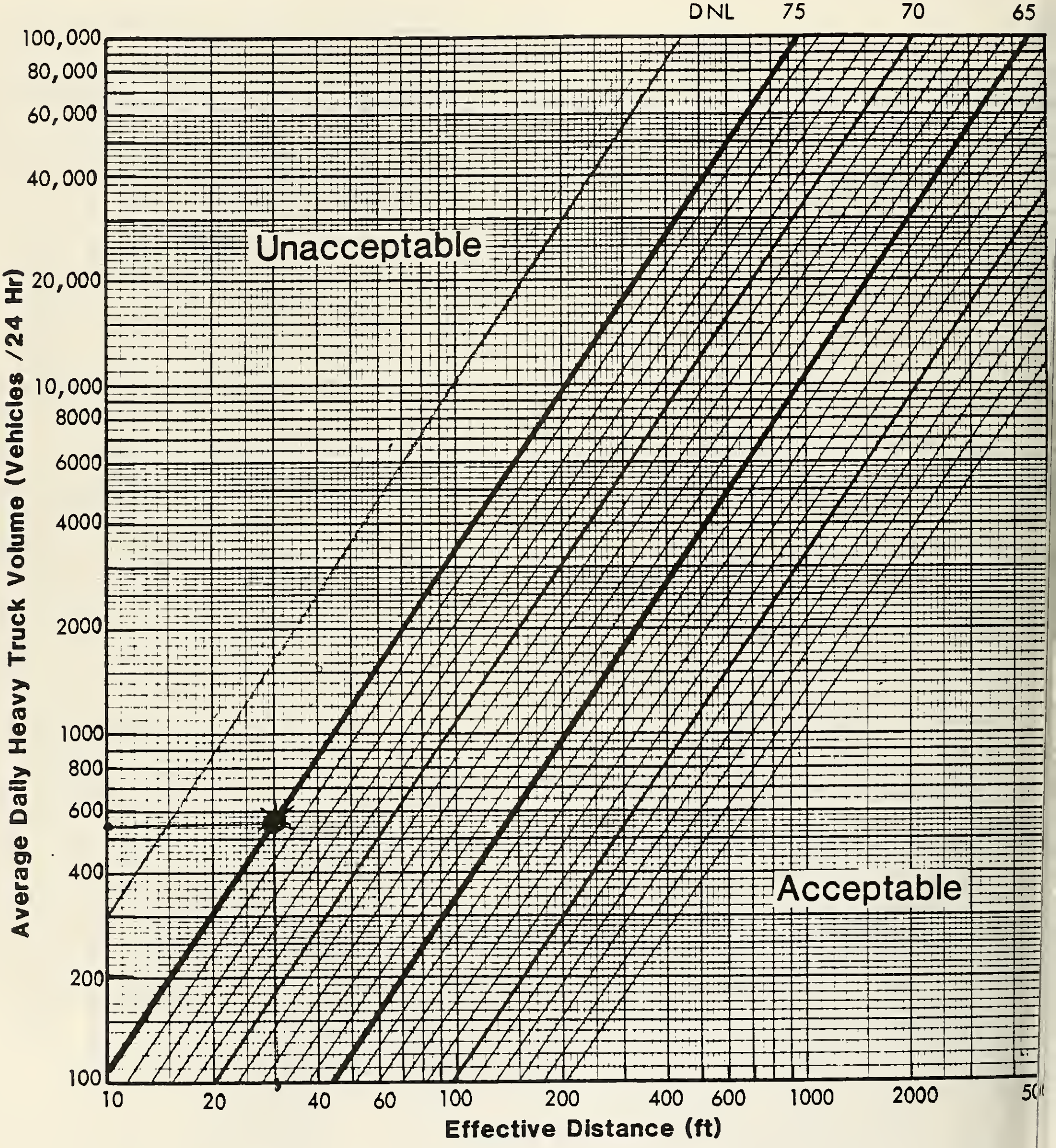
∴ 16589 x .26 = 4313 A

dB = 68

EXISTING 1989

Workchart 2
Heavy Trucks (55 mph)

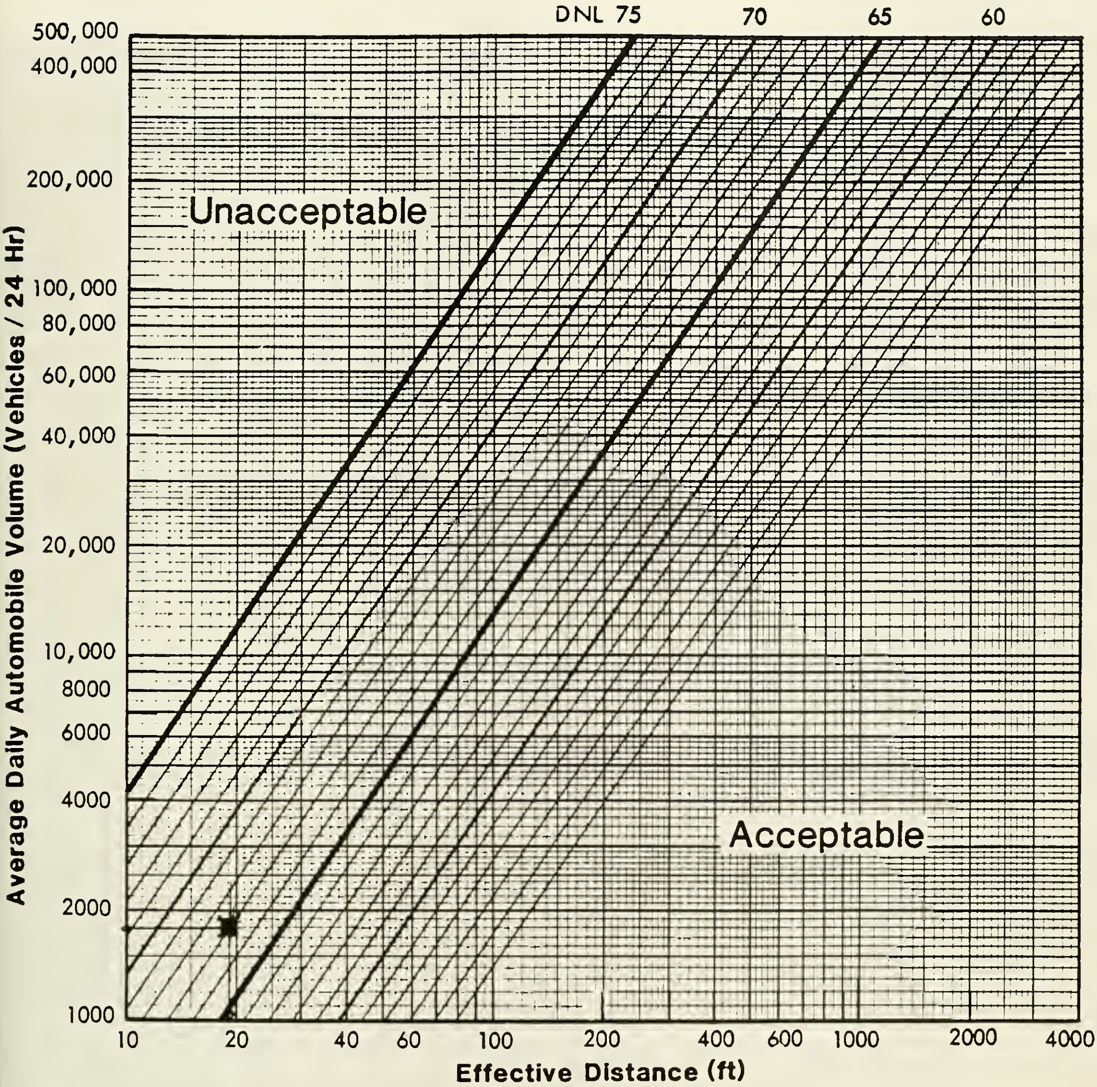
TREMONT ON THE COMMON



TREMONT ST. = 691 HT
DISTANCE = 30'
SPEED LESS THAN 50
MPH = .81
∴ 691 × .81 = 560 HT

Workchart 1
Autos (55 mph)

TOURAINE BUILDING

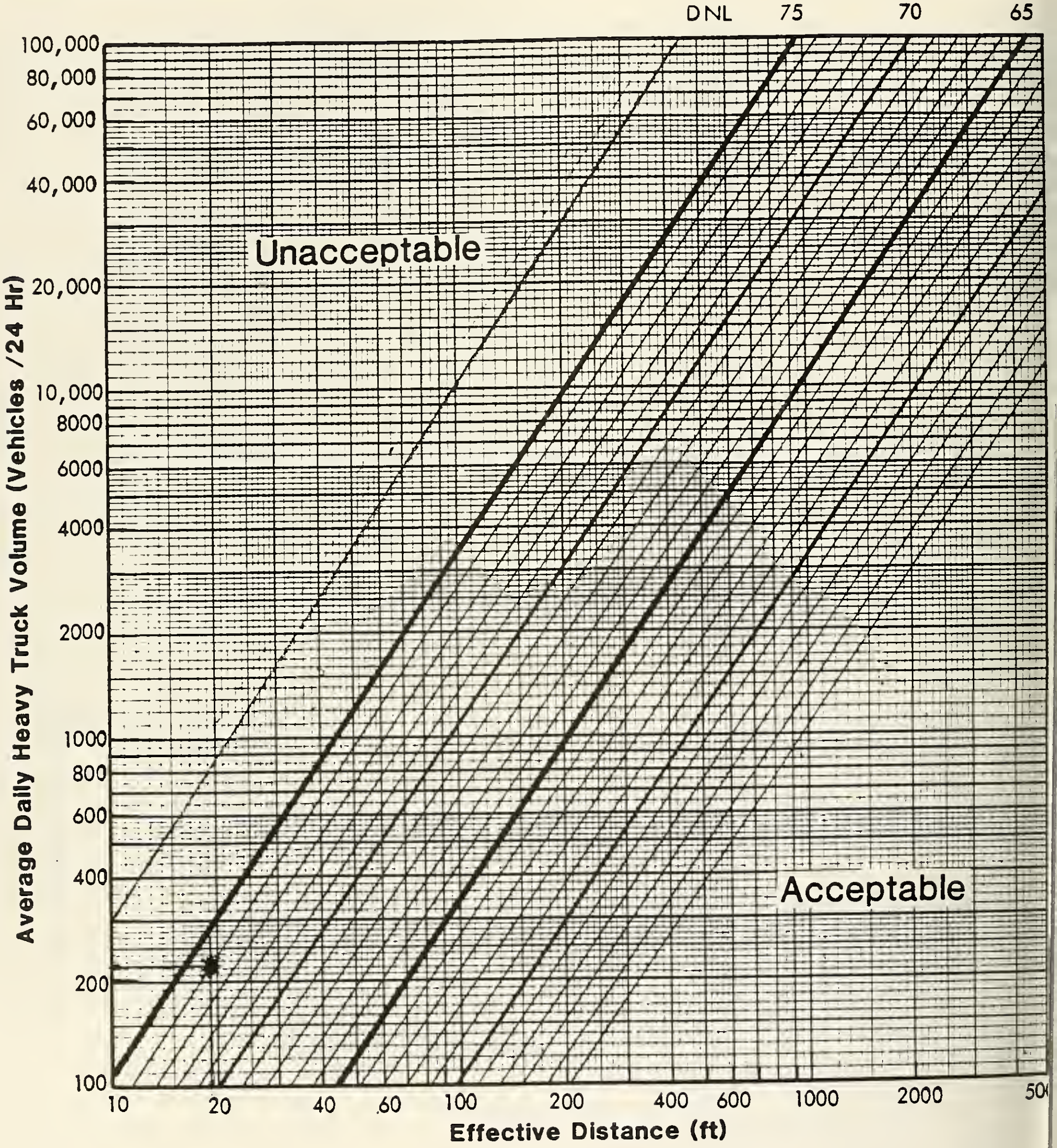


BOYLSTON ST = 6852 AUTO
DISTANCE = 19 f
AVG TRAFFIC SPEED = 27 mPH
ADJ. FACTOR = 0.26
∴ 6852A × .26 = 1,781

EXISTING 1989 16 of 51

TOURAINE BUILDING

Workchart 2
Heavy Trucks (55 mph)



BOYLSTON ST = 285 HEAVY TRUCKS
DISTANCE = 19 f
AVG SPEED = 27 mph
∴ 285 HT × .81 = 231

Title COMMONWEALTH CENTER By RL Date 3/29/89

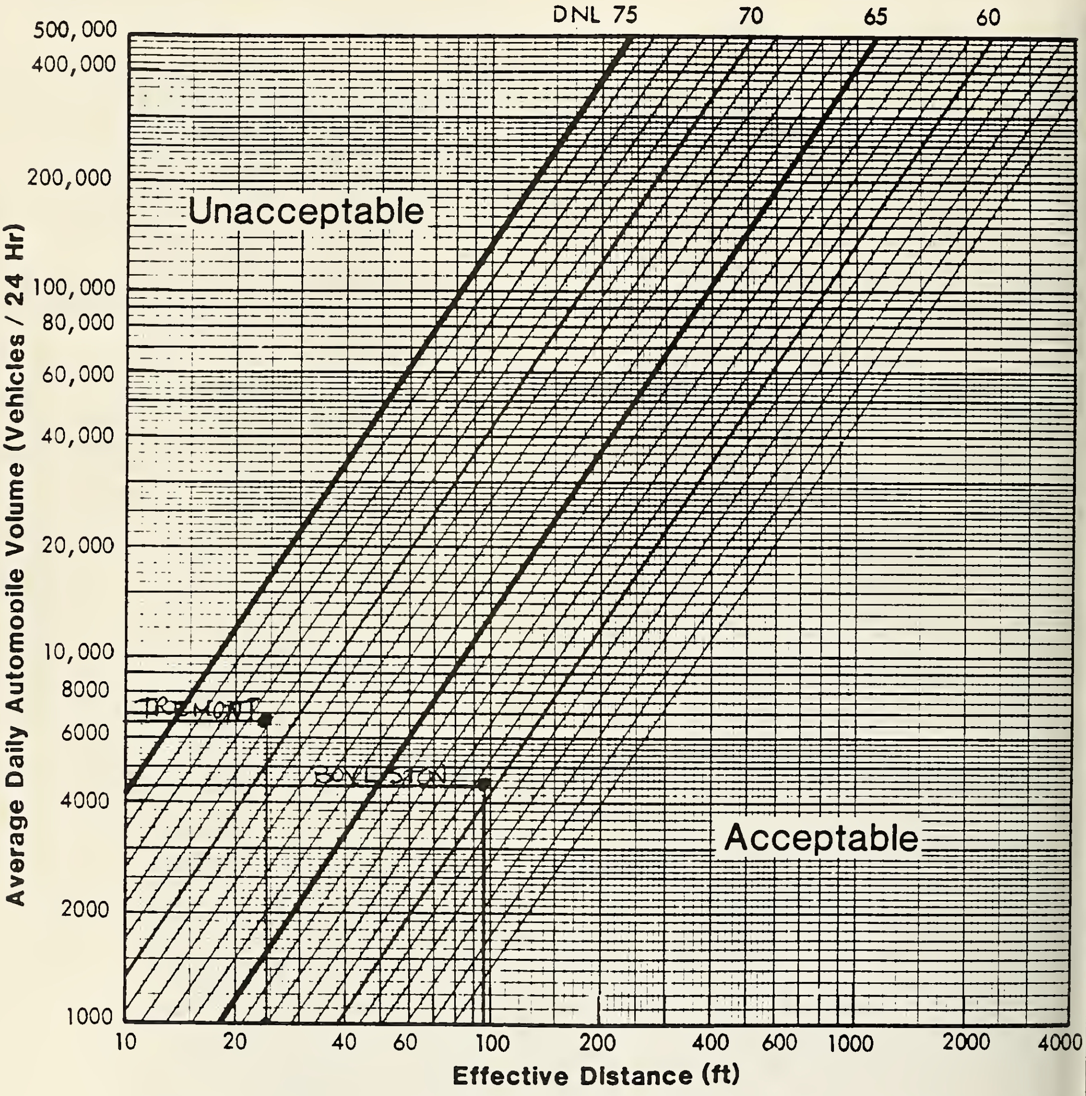
Project no Ck'd Sheet no 17 of 51

EXISTING 1989

			DNL	
BOSTON COMMON	TREMONT ST.	AUTO	70	
		TRUCK	76	
	BOYLSTON ST.	AUTO	59	
		TRUCK	66	
			77	UNACCEPTABLE
CHINA TRADE CENTER	BOYLSTON ST.	AUTO	67	
		TRUCK	74	
			75	UNACCEPTABLE
RETAIL STORE	WASHINGTON ST.	AUTO	66	
		TRUCK	73	
			74	
HOTEL ENTRANCE	AVERY ST.	AUTO	54	
		TRUCK	60	
			61	
MASON PLACE	AVERY ST.	AUTO	55	
		TRUCK	61	
			62	
PARK PLACE WEST	TREMONT ST.	AUTO	68	
		TRUCK	75	
			76	
TREMONT ON THE COMMON	TREMONT ST.	AUTO	68	
		TRUCK	75	
			76	
TOURAINE BUILDING	BOYLSTON ST.	AUTO	67	
		TRUCK	74	
			75	

NO BUILD 1996
BOSTON COMMON

Workchart 1
Autos (55 mph)



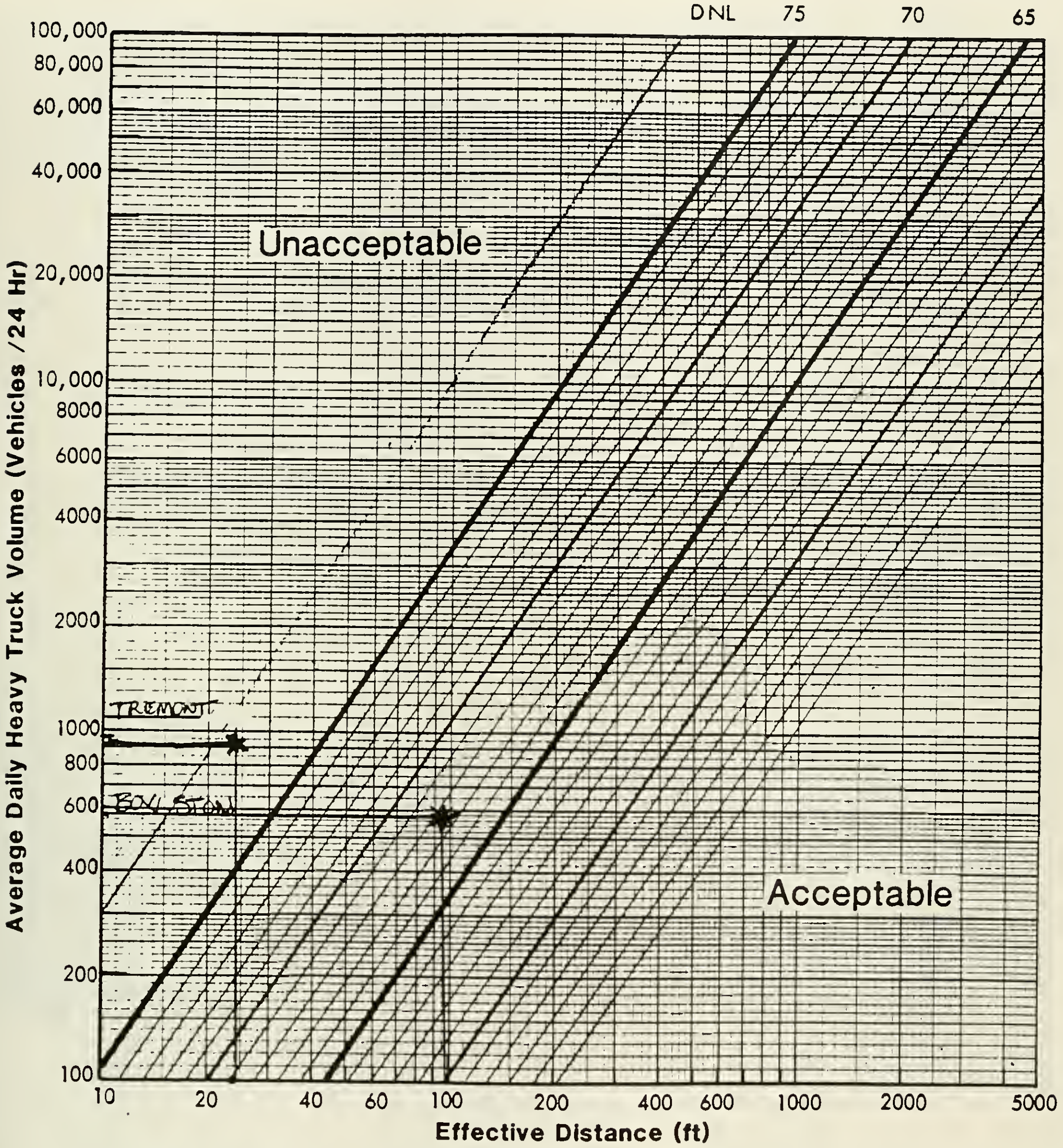
TREMONT ST = 26,822 AUTO
DISTANCE = 24f
BOYLSTON ST = 17,645 AUTO
DISTANCE = 96f

AVG TRAFFIC SPEED = 27m
ADJ FACTOR = 0.26

∴ TREMONT 26,822 × .26 = 6,97
BOYLSTON 17,645 × 26 = 4,58

NO BUILD 1996
BOSTON COMMON

Workchart 2
Heavy Trucks (55 mph)



TREMONT ST = 1,118 HEAVY TRUCKS
DISTANCE = 24 f

BOYLSTON ST = 735 HEAVY TRUCKS
DISTANCE = 96 f

TRAFFIC SPEED LESS THAN 50 MPH =
.81

∴ TREMONT 1118 HT × .81 = 906
BOYLSTON 735 HT × .81 = 595

NO BUILD 1996

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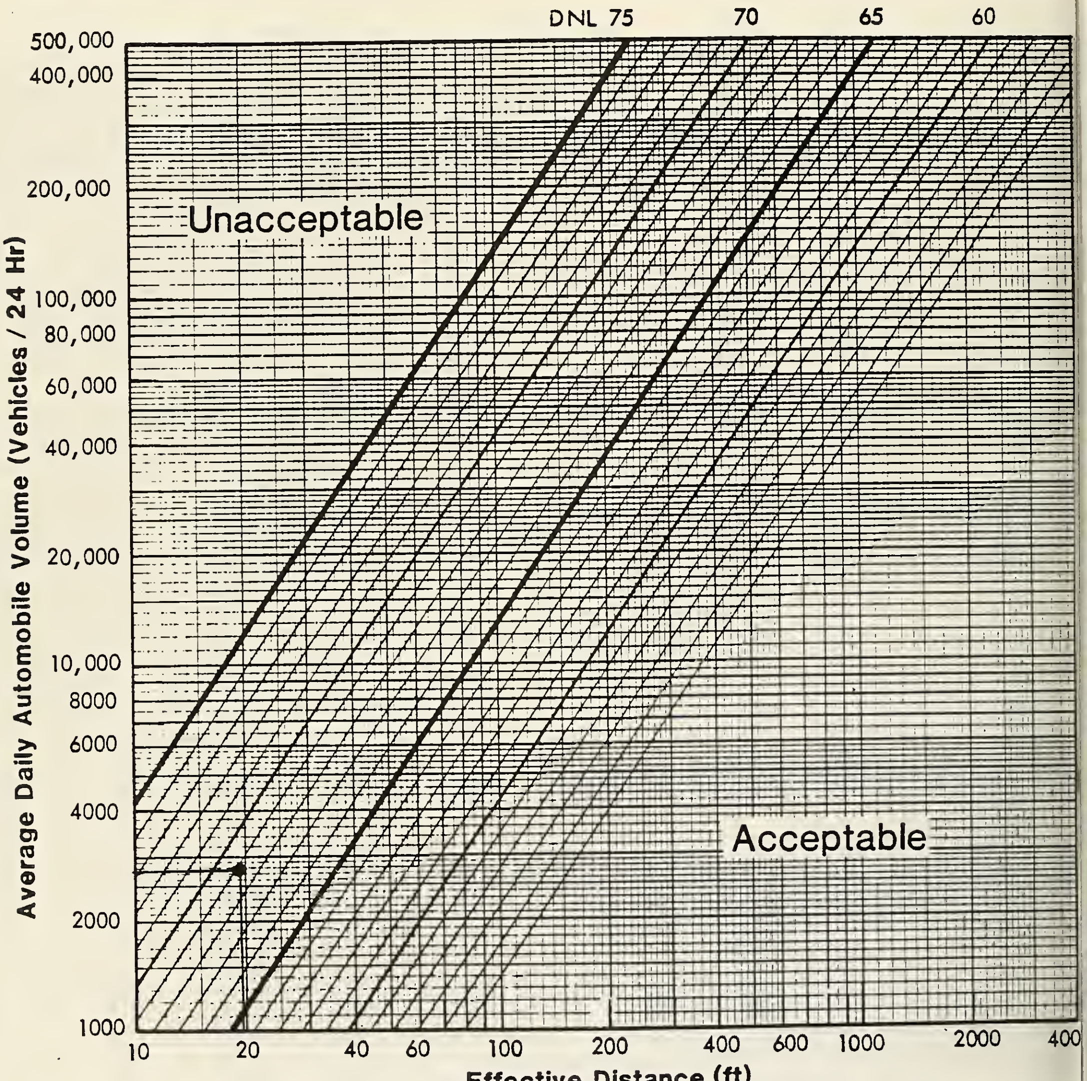
Workchart 1
Autos (55 mph)

CHINA TRADE CENTER



BOYLSTON ST = 10,589 AUTO
DISTANCE = 19 f

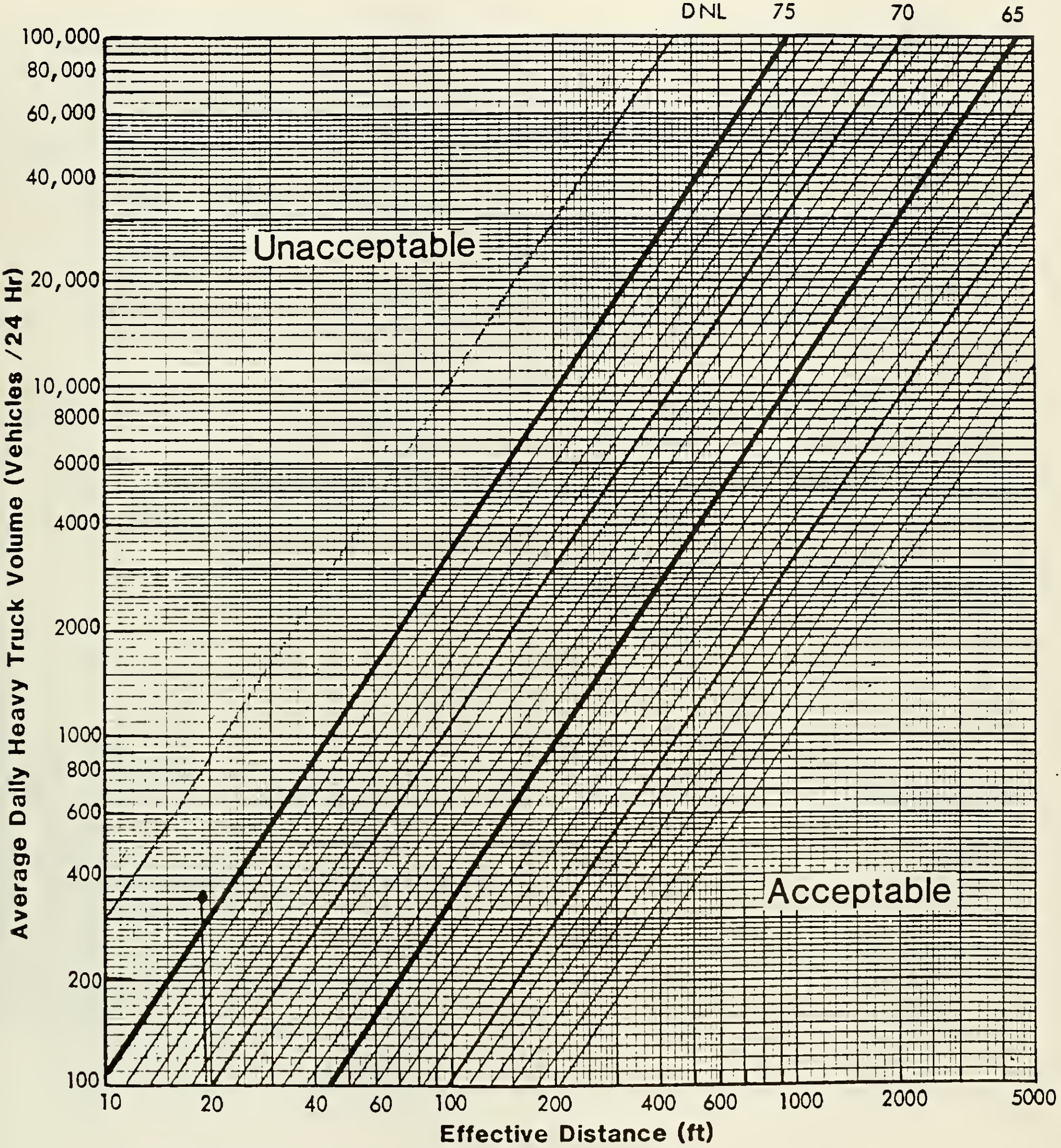
AVG. TRAFFIC SPEED = 27 mph
ADJ. FACTOR = 0.26

∴ 10,589 A × .26 = 2,753

NO BUILD 1996 21 of 51

CHINA TRADE CENTER

Workchart 2
Heavy Trucks (55 mph)



BOYLSTON ST = 441 HEAVY TRUCK
DISTANCE = 19 ft

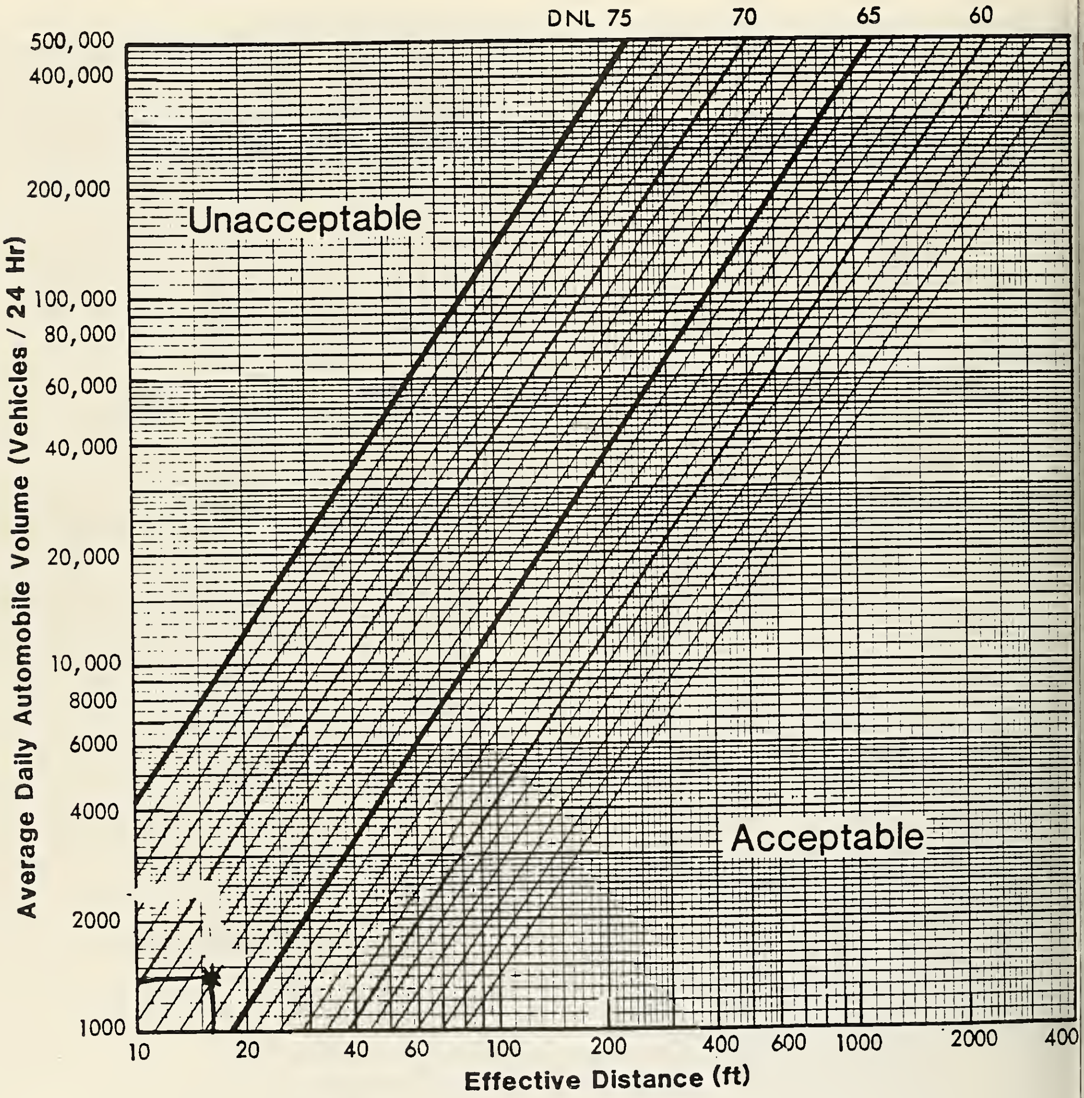
SPEED LESS THAN 50 MPH

∴ 441 HT × .81 = 357

NO BUILD 1996

Workchart 1
Autos (55 mph)

RETAIL STORE

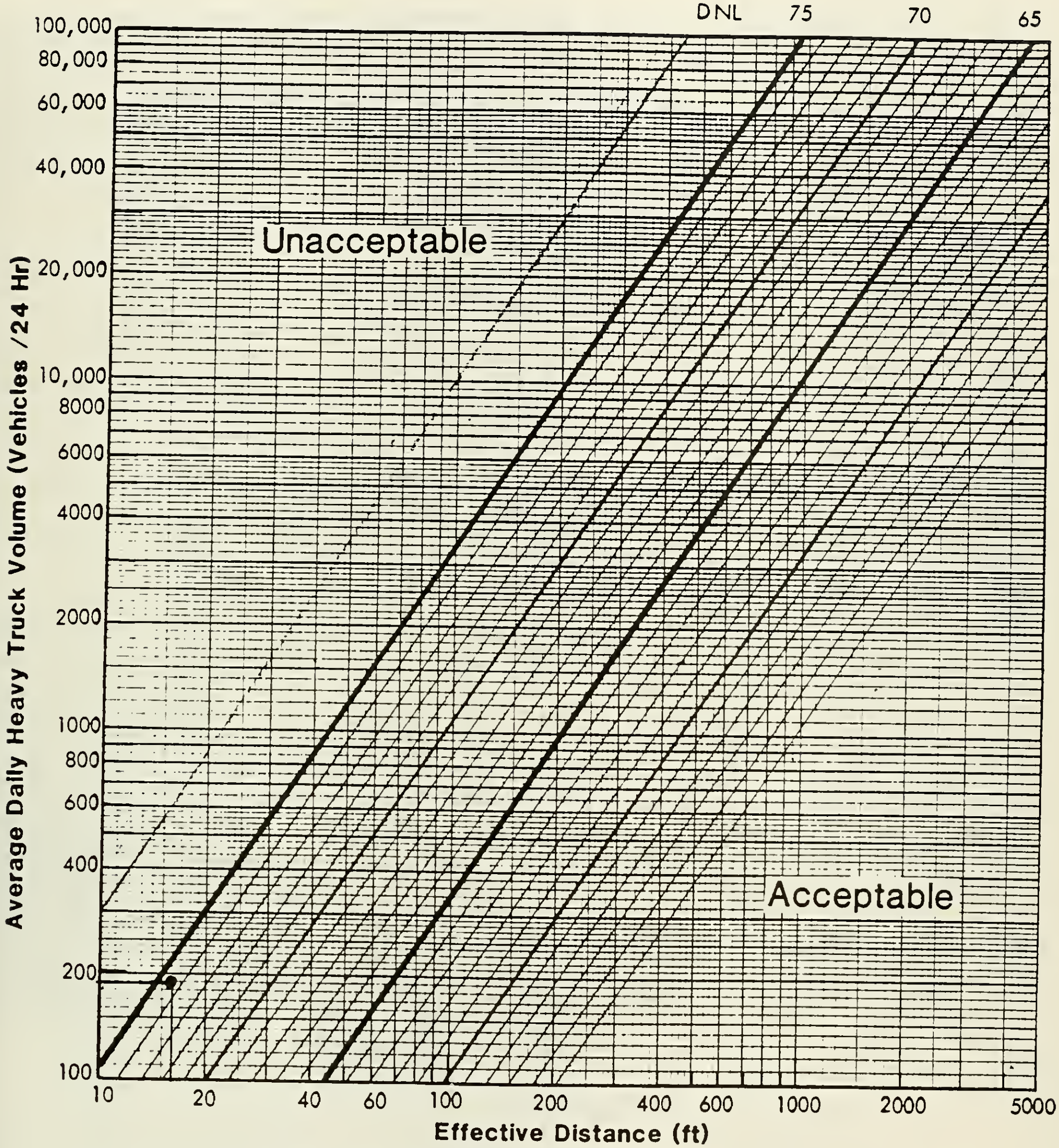


WASHINGTON ST. = 5,606 AUTOS
DISTANCE = 16f
AVG. TRAFFIC SPEED = 27 mph
ADJ. FACTOR = .26
∴ 5606 A × .26 = 1,458

NO BUILD 1996

Workchart 2
Heavy Trucks (55 mph)

RETAIL STORE



WASHINGTON ST. = 234 HEAVY TRUCKS
DISTANCE = 16 f

AVG SPEED LESS THAN 50 MPH = 0.81

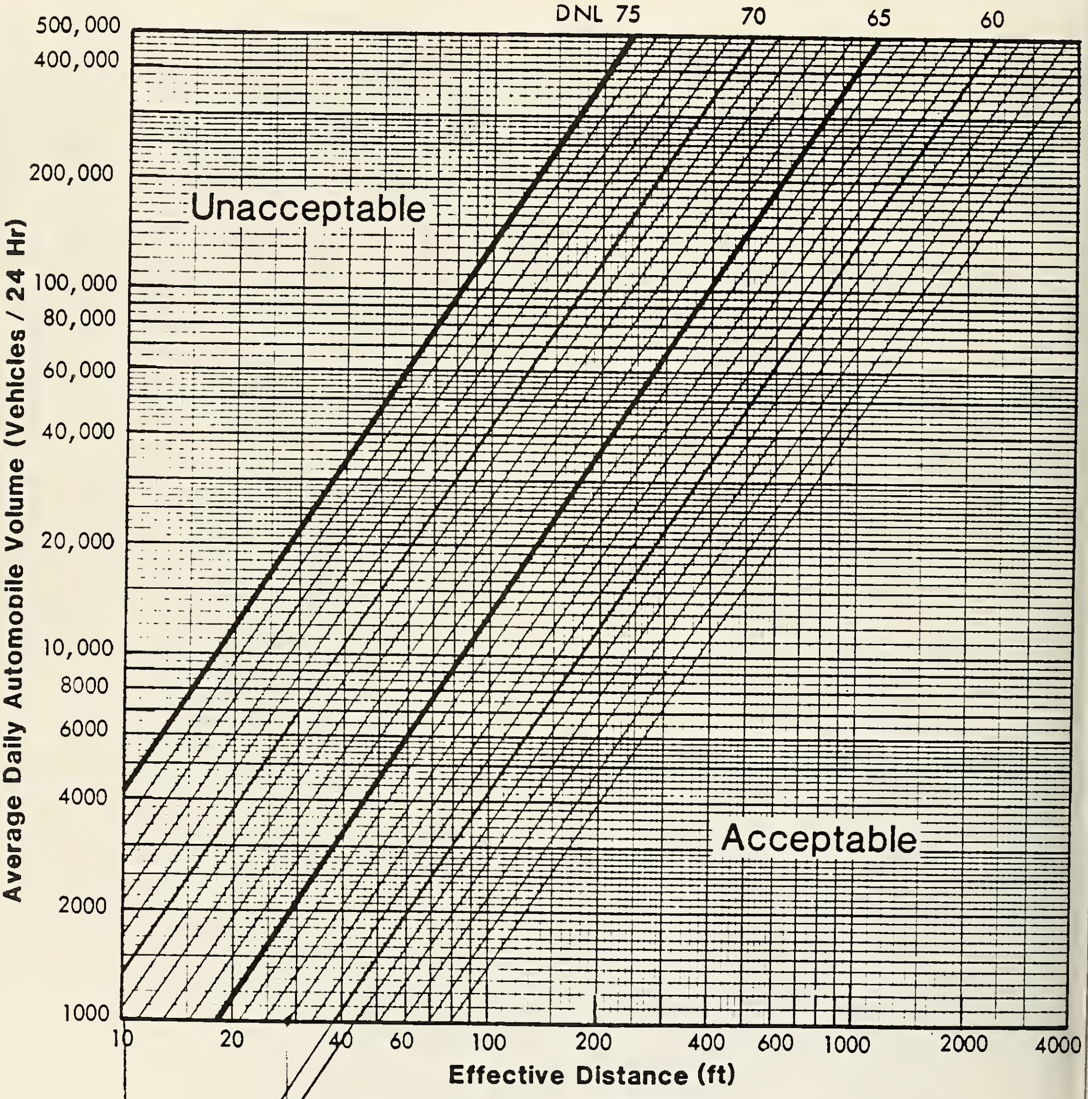
∴ WASHINGTON 234 HT × .81 = 190

NO BUILD 1996

HOTEL ENTRANCE

24 of 51

Workchart 1
Autos (55 mph)



AVERY ST. = 2,064 AUTOS

DISTANCE = 29 f

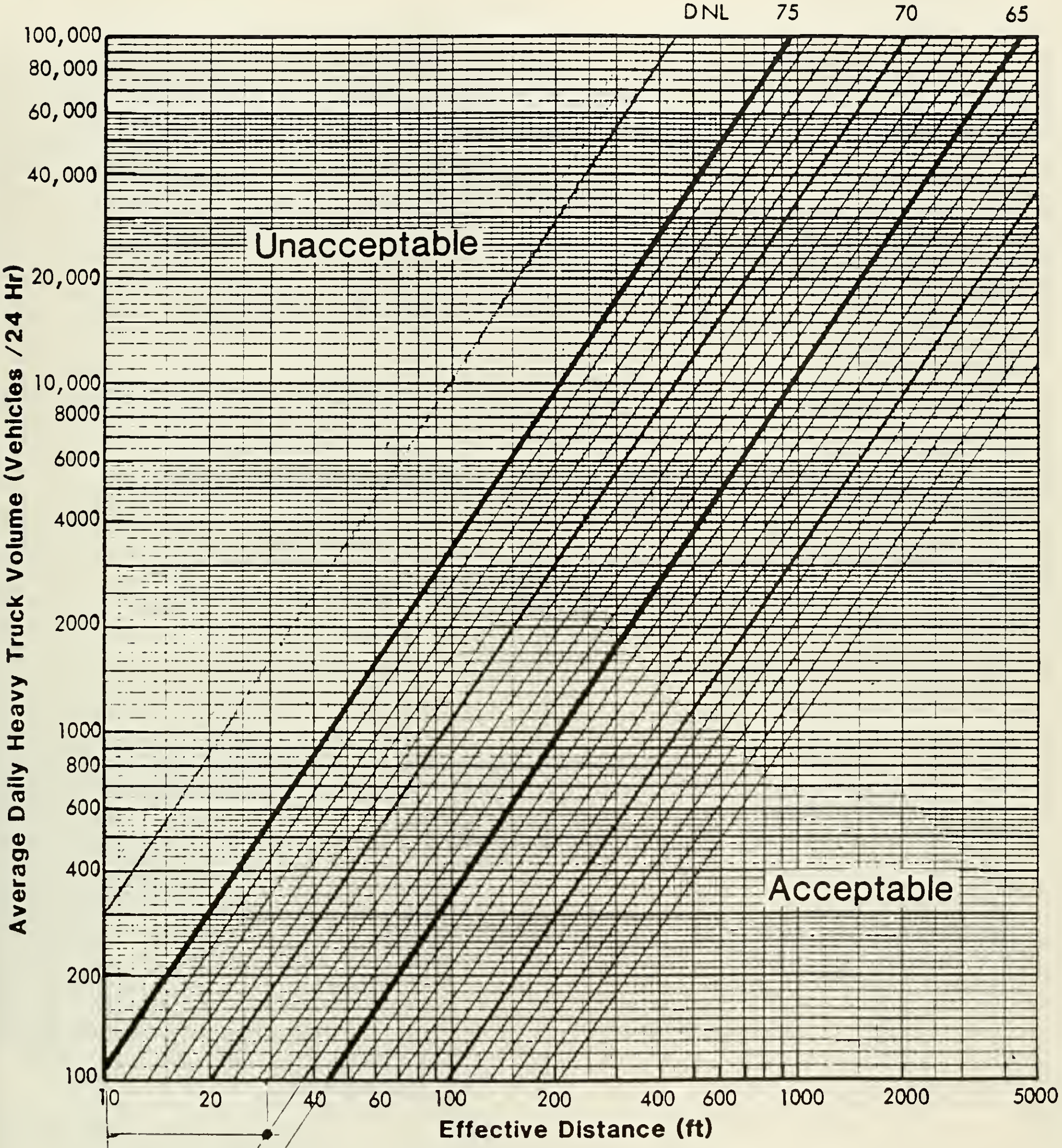
AVG TRAFFIC SPEED = 27mph

ADJ. FACTOR = 0.26

∴ 2,067^A x .26 = 537A

NO BUILD 1996
HOTEL ENTRANCE

Workchart 2
Heavy Trucks (55 mph)



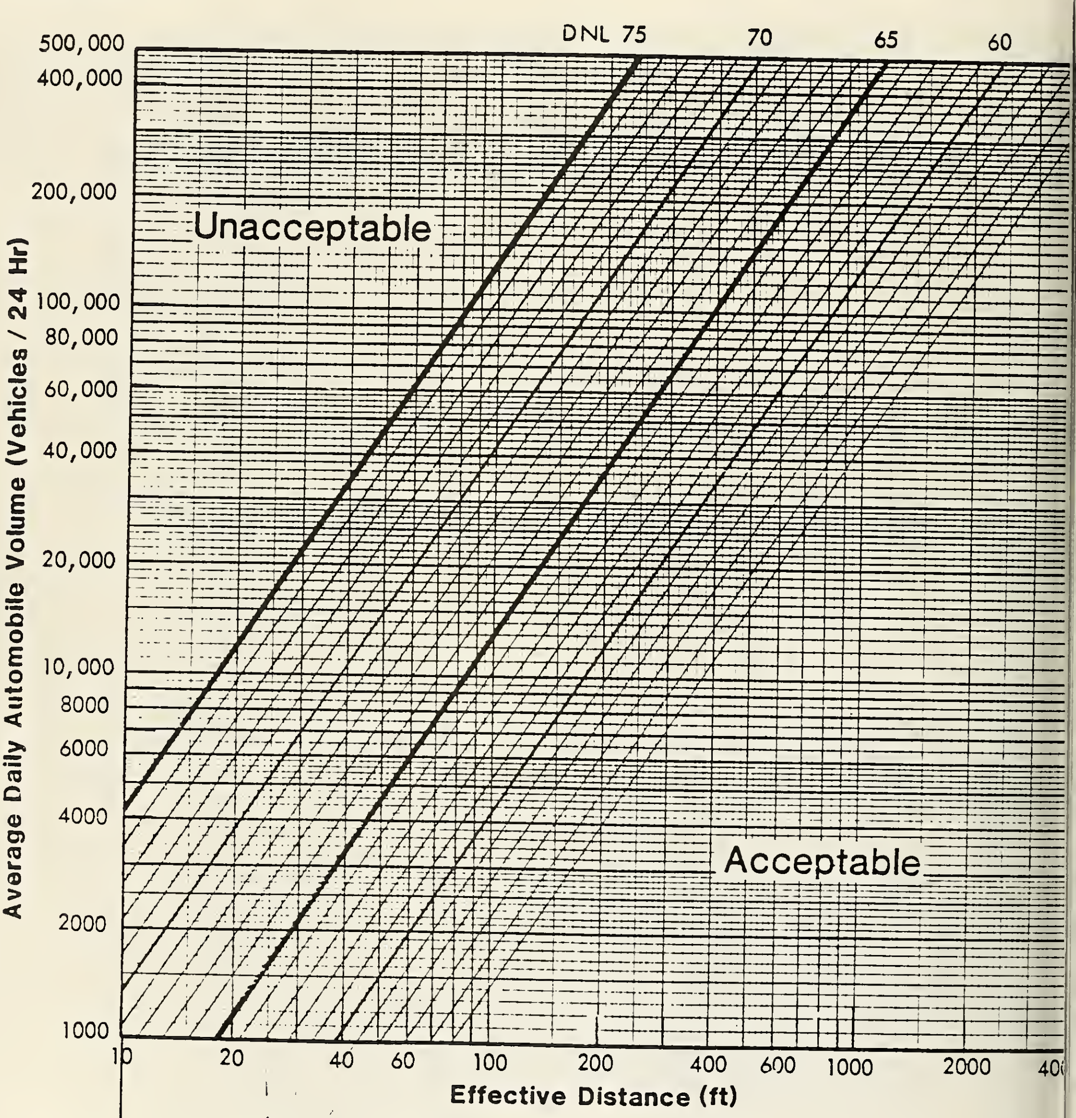
AVERY ST = 86 HEAVY TRUCK
DISTANCE = 29 f
SPEED LESS THAN 50MPH = 0.81
∴ 86 HT × .81 = 70

NO BUILD 1996

26 of

Workchart 1
Autos (55 mph)

MASON PLACE



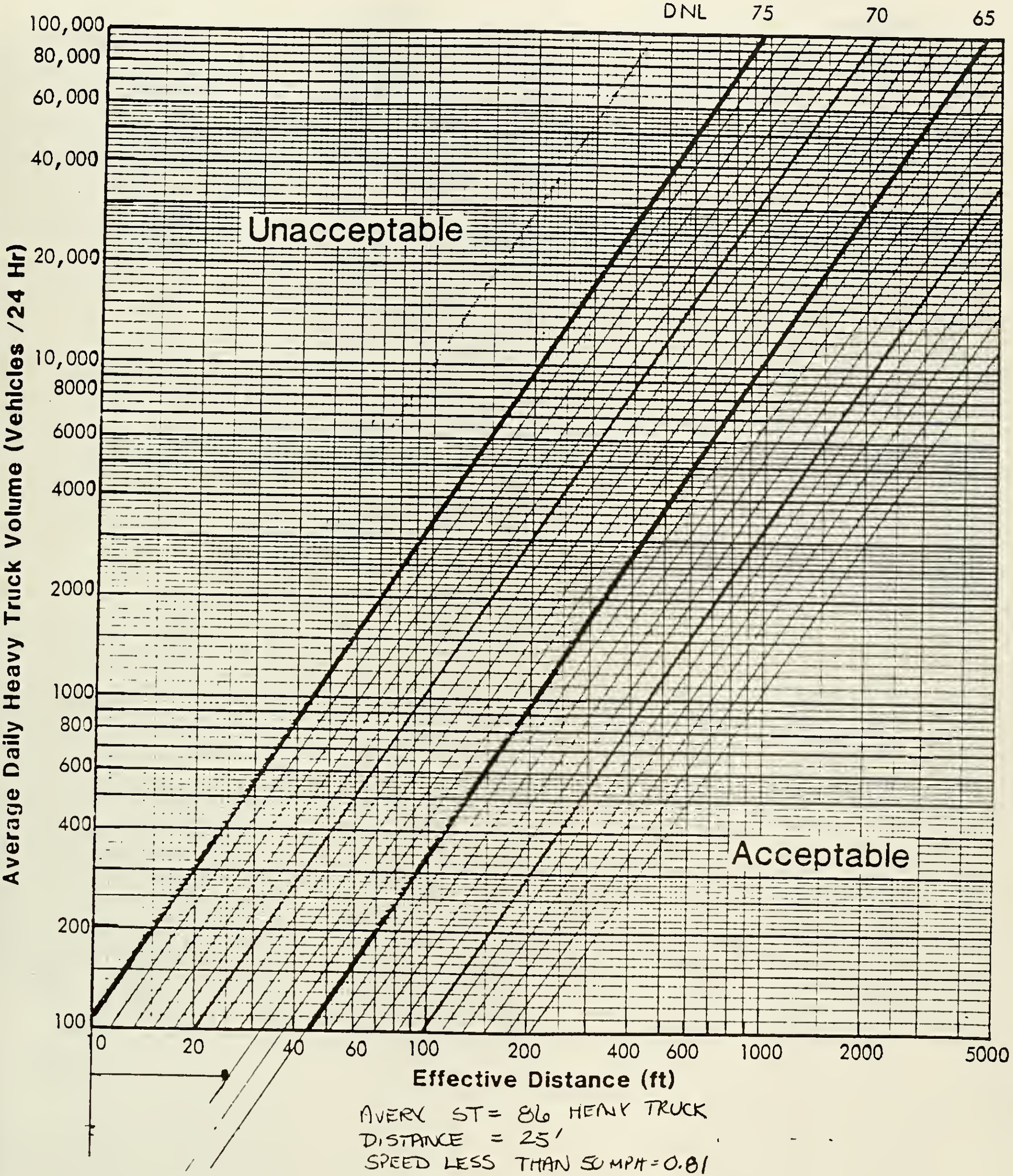
AVERY ST. = 2064 AUTOS
DISTANCE = 25 f
AVG TRAFFIC SPEED = 27 m
ADJ. FACTOR = 0.26
∴ 2064A x .26 = 537 A

59

NO BUILD 1996
MASON PLACE

27 of 51

Workchart 2
Heavy Trucks (55 mph)

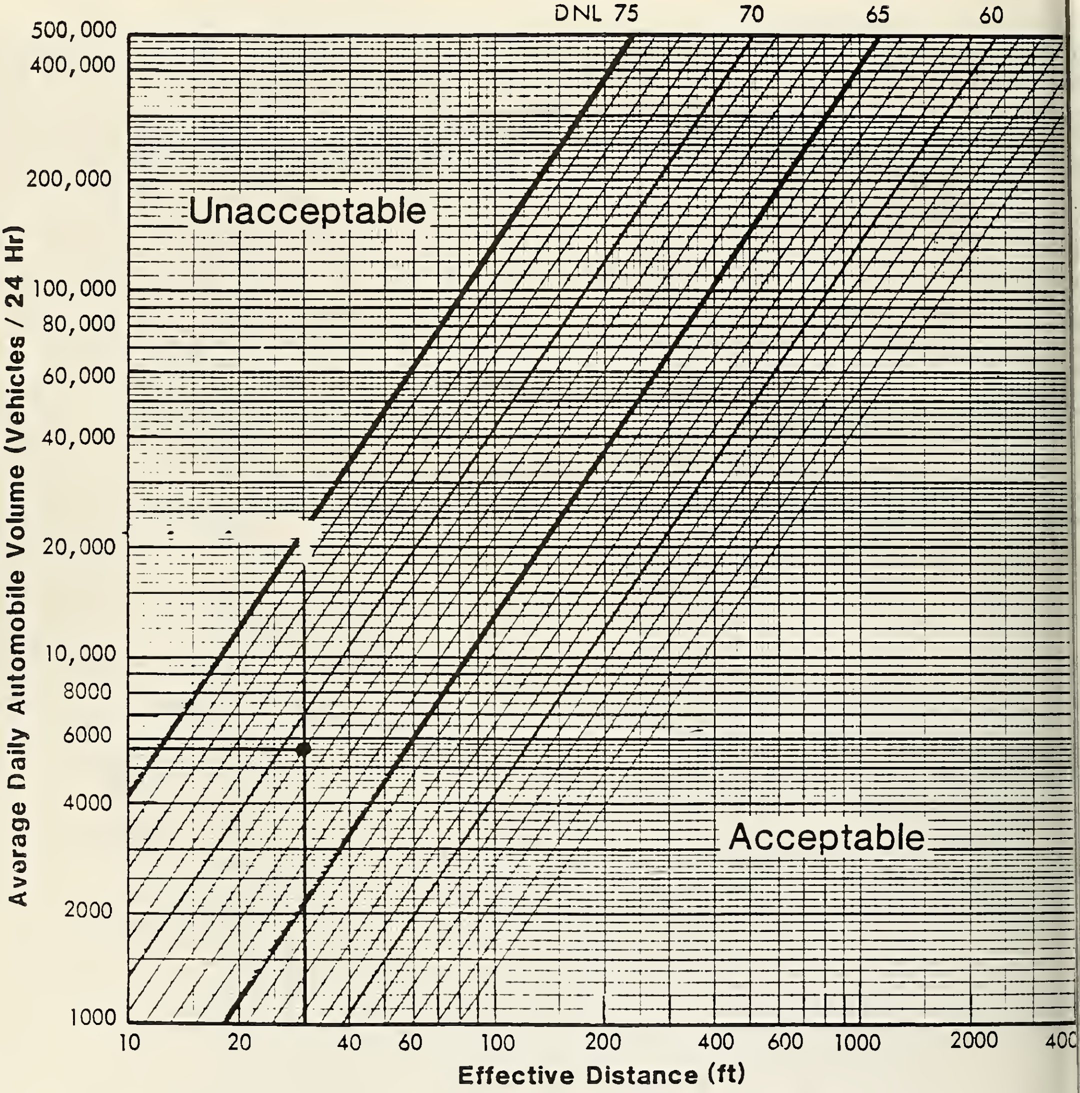


AVERY ST = 86 HEAVY TRUCK
DISTANCE = 25'
SPEED LESS THAN 50 MPH = 0.81
∴ 86 HT × .81 = 70

NO BUILD 1996

PARK SIDE WEST

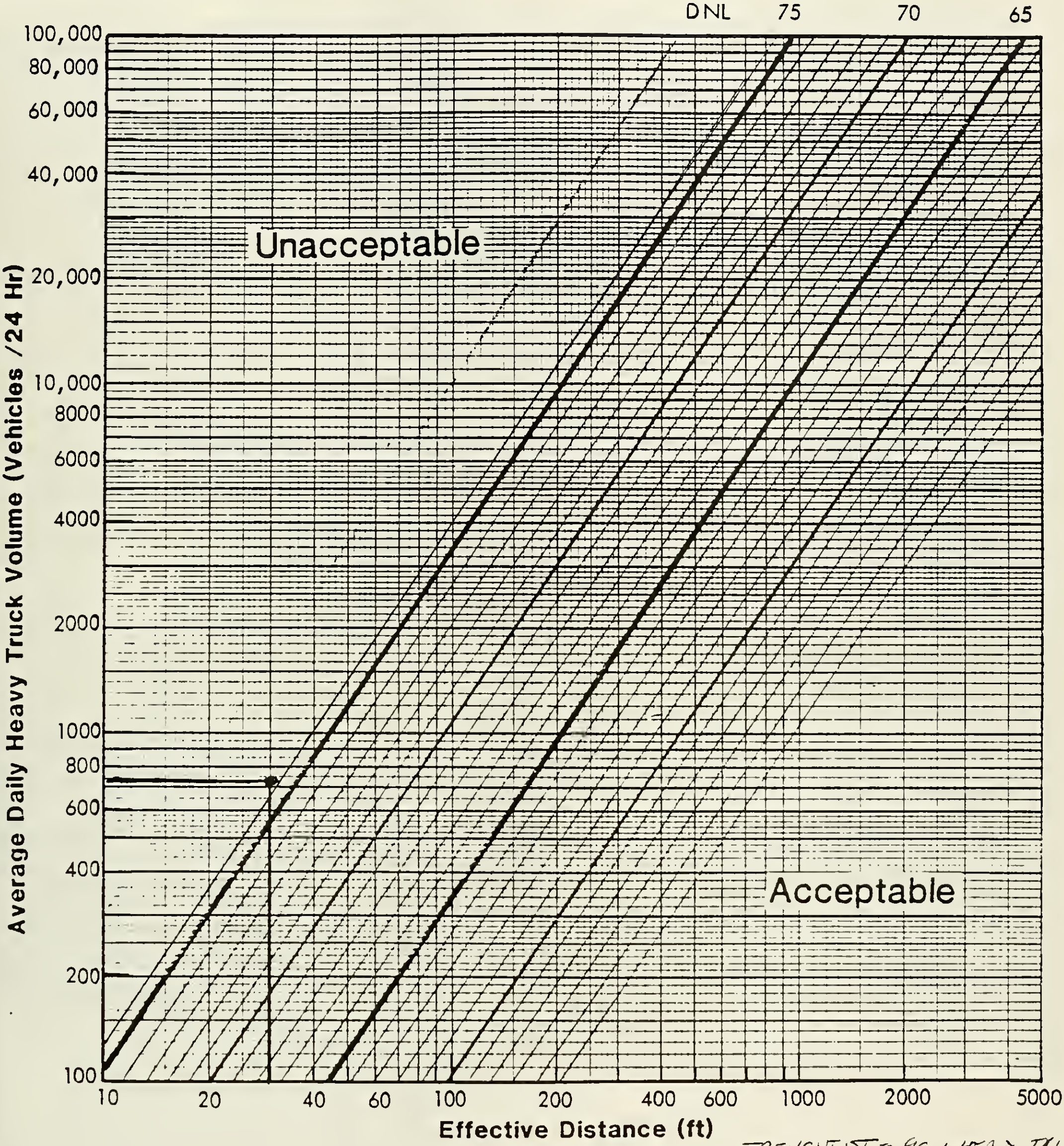
Workchart 1
Autos (55 mph)



TREMONT ST = 21,706 AUTOS
DISTANCE = 30'
AVG TRAFFIC SPEED = 27 MP
ADJ. FACTOR = 0.26
∴ 21,706A x .26 - 5,644 A
69

NO BUILD 1996 29 of 51
PARK SIDE WEST

Workchart 2
Heavy Trucks (55 mph)



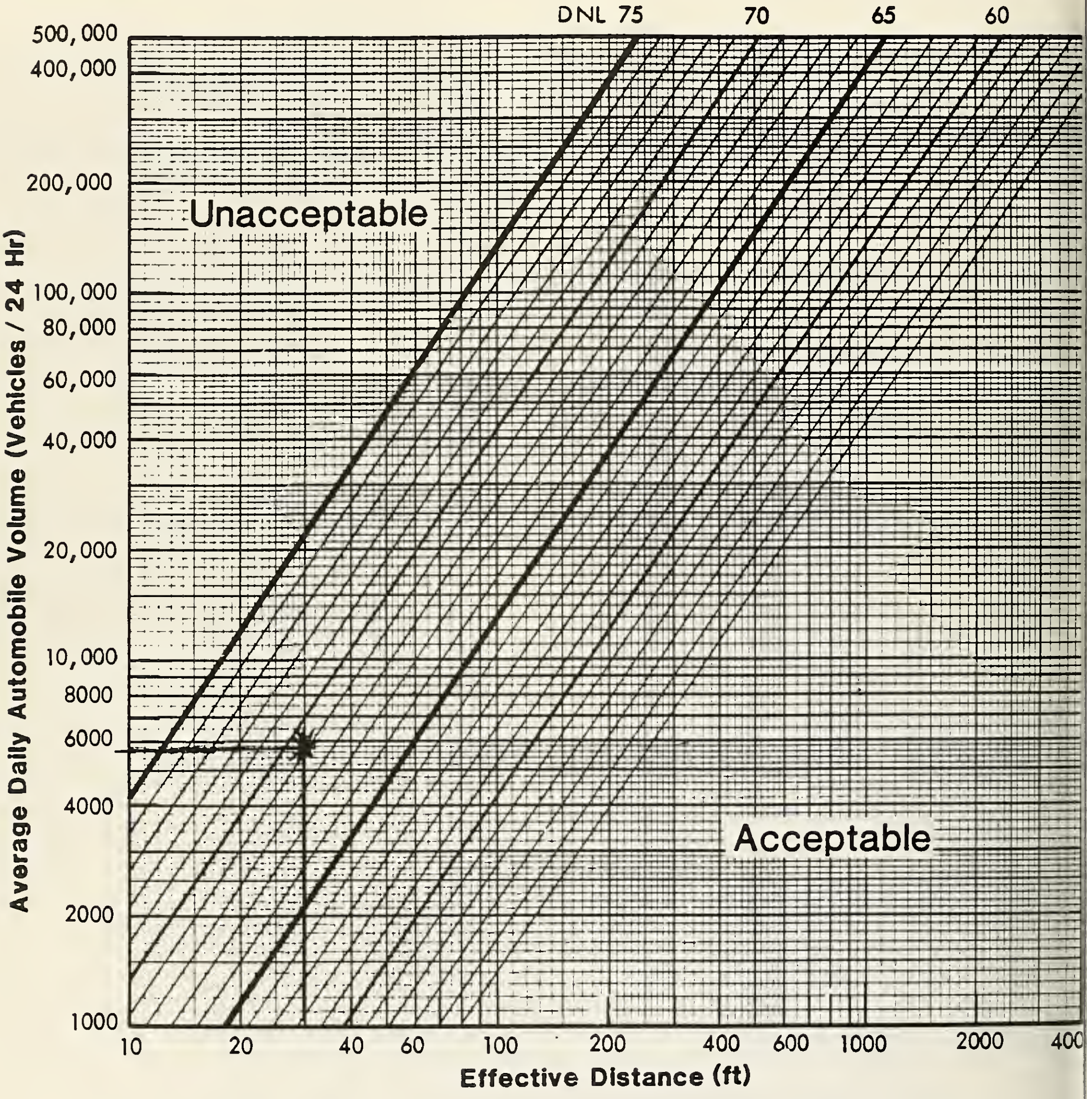
TREMONT ST = 904 HEAVY TRUC
DISTANCE = 30'
SPEED LESS THAN 50 MPH = .81
∴ 904 × .81 = 732

76

NO BUILD 1996 30 of 51

TREMONT ON THE COMMON

Workchart 1
Autos (55 mph)

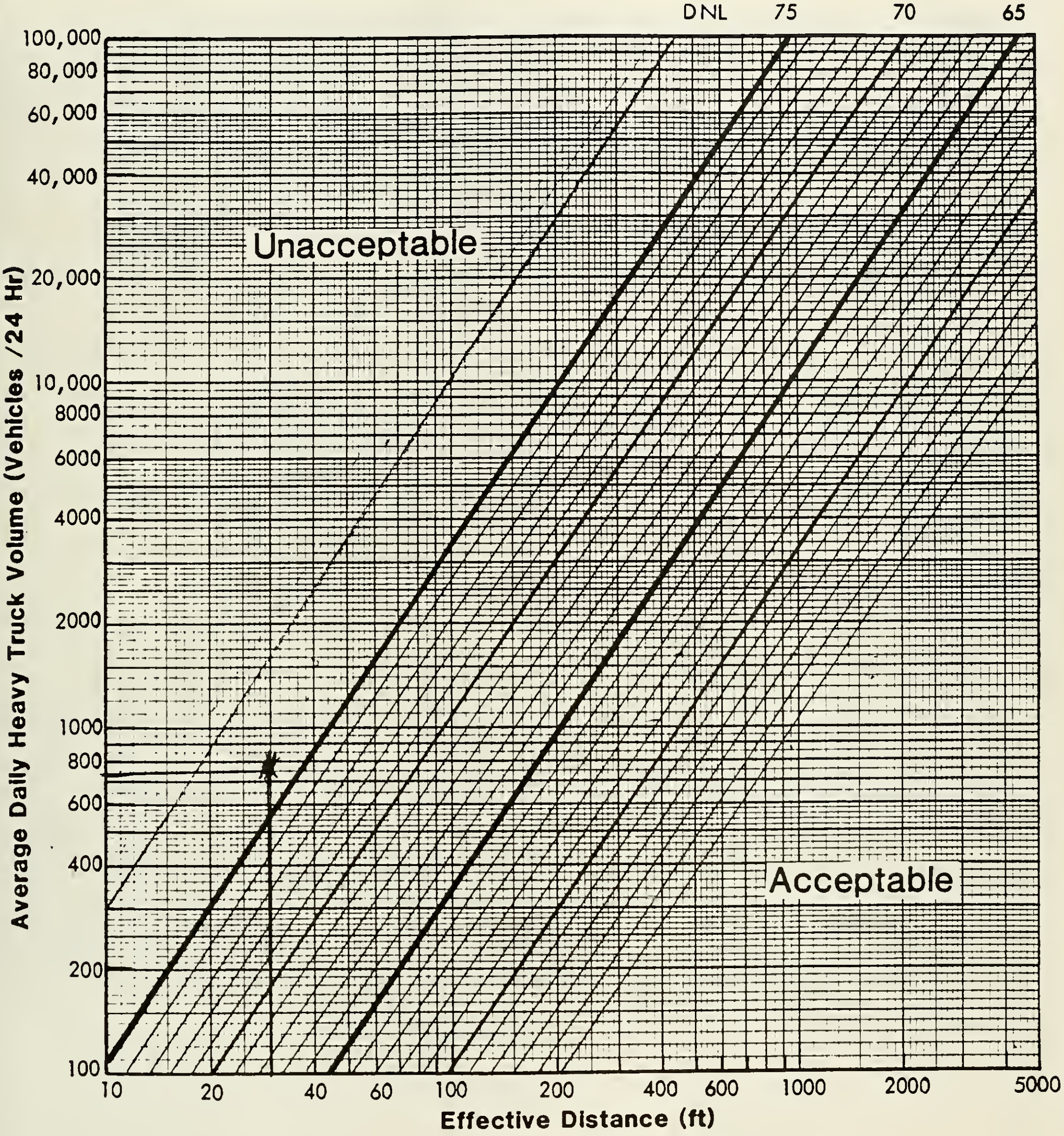


TREMONT ST = 21,706 AUTOS
DISTANCE = 30′
AVG TRAFFIC SPEED = 27 mph
ADJ. FACTOR = 0.26
∴ 21,706 x .26 = 5644 A
69

NO BUILD 1996 31 of 51

TREMONT ON THE COMMON

Workchart 2
Heavy Trucks (55 mph)



TREMONT ST = 904 HEAVY TRUC

DISTANCE = 30'

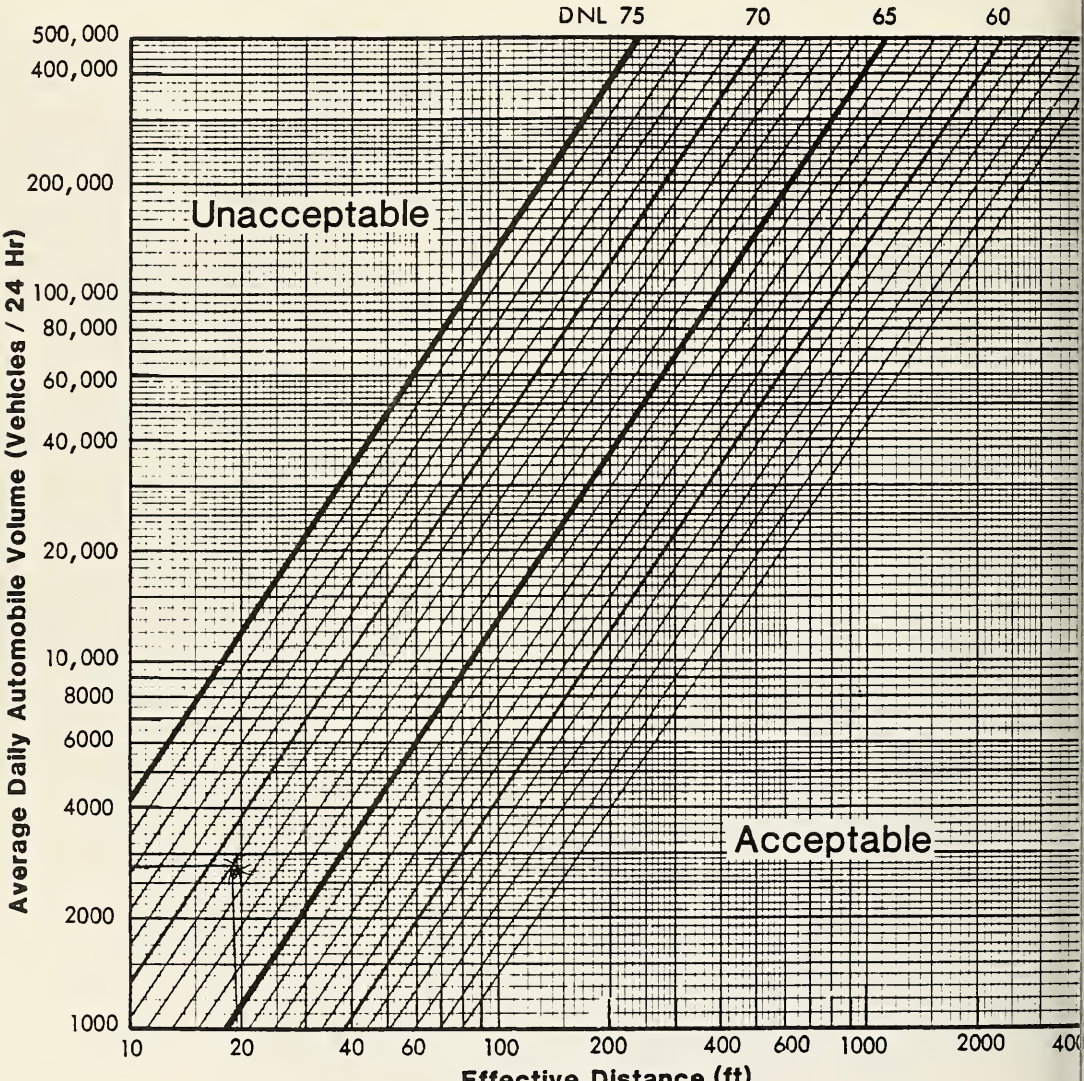
SPEED LESS THAN 50MPH = .81

∴ 904 × .81 = 732

NO BUILD 1996

TOURAINE BUILDING

Workchart 1
Autos (55 mph)



BOYLSTON ST = 10,589 AUTO
DISTANCE = 19 f
AVG TRAFFIC SPEED = 27 mph
ADJ. FACTOR = 0.26
∴ 10,589 A × .26 = 2,753

NO BUILD 1996

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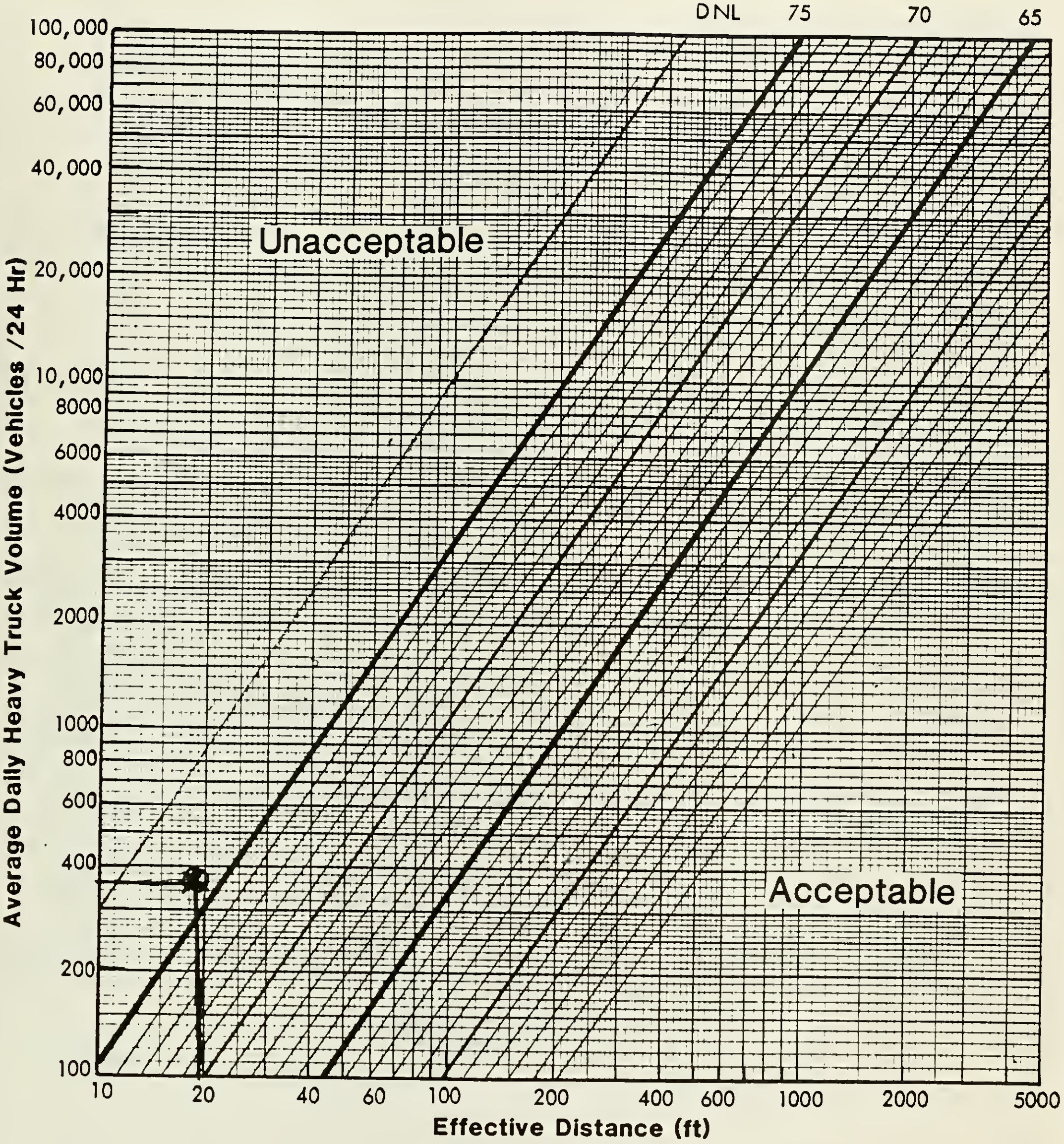
Workchart 2
Heavy Trucks (55 mph)

TOURAINE BUILDING



BOYLSTON ST = 441 HEAVY TRUCK
DISTANCE = 19 f
SPEED LESS THAN 50 MPH
∴ 441 HT × .81 = 357

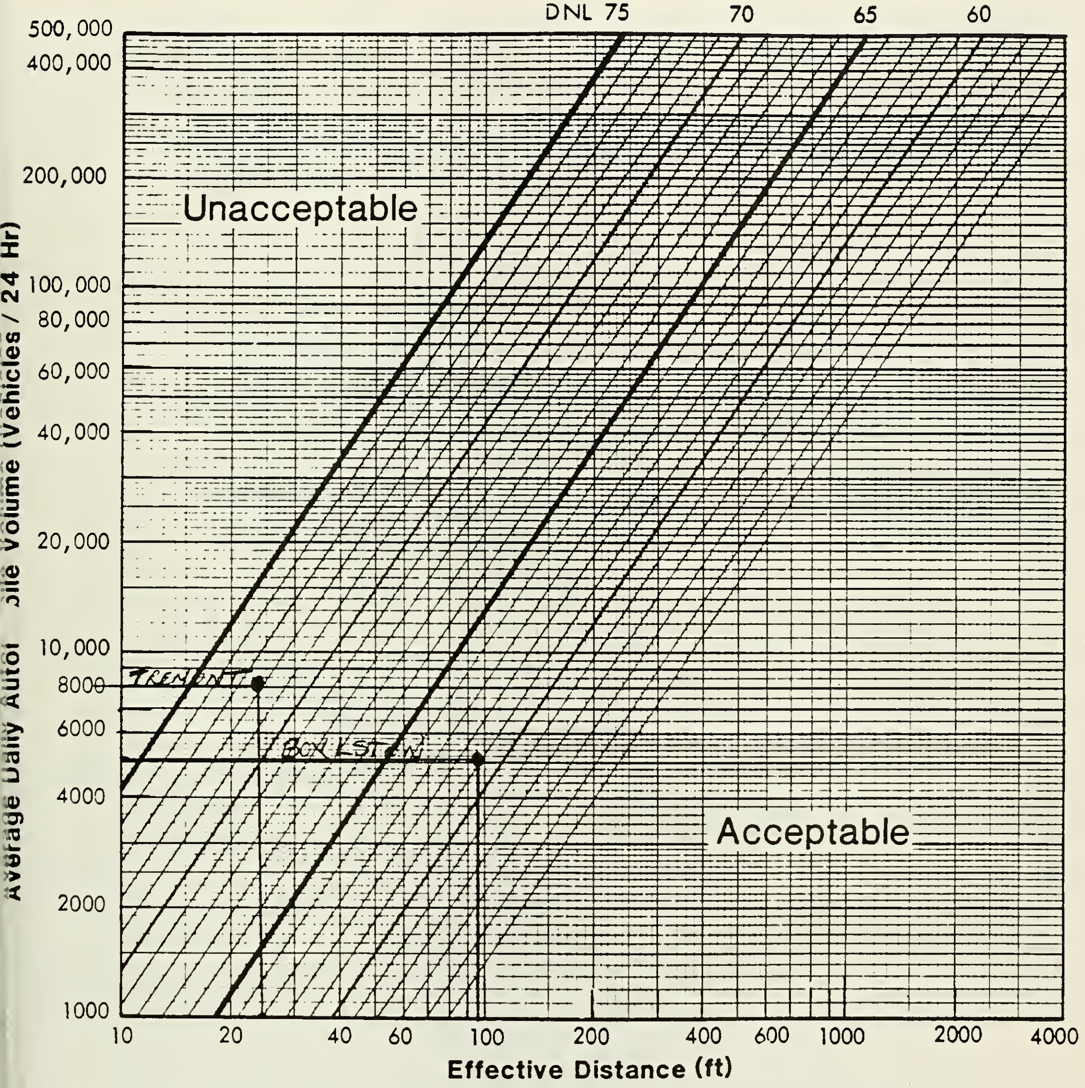
Title COMMONWEALTH CENTER By RL Date 3/29/89
Project no Ck'd Sheet no 34 of 51

NO BUILD 1996

			DNL	
BOSTON COMMON	TREMONT ST.	AUTO	71	
		TRUCK	79	
	BOYLSTON ST.	AUTO	61	
		TRUCK	68	
			80	UNACCEPT
CHINA TRADE CENTER	BOYLSTON ST.	AUTO	69	
		TRUCK	76	
			77	UNACCEPT
RETAIL STORE	WASHINGTON ST.	AUTO	67	
		TRUCK	75	
			76	UNACCEPT
HOTEL ENTRANCE	AVERY ST.	AUTO	59	
		TRUCK	66	
			67	
MASON PLACE	AVERY ST.	AUTO	60	
		TRUCK	67	
			68	
PARK SIDE WEST	TREMONT ST	AUTO	69	
		TRUCK	76	
			77	UNACCEPT
TREMONT ON THE COMMON	TREMONT ST	AUTO	69	
		TRUCK	76	
			77	UNACCEPT
TOURAINE BUILDING	BOYLSTON ST.	AUTO	69	
		TRUCK	76	
			77	UNACCEPT

Workchart 1
Autos (55 mph)

BOSTON COMMON



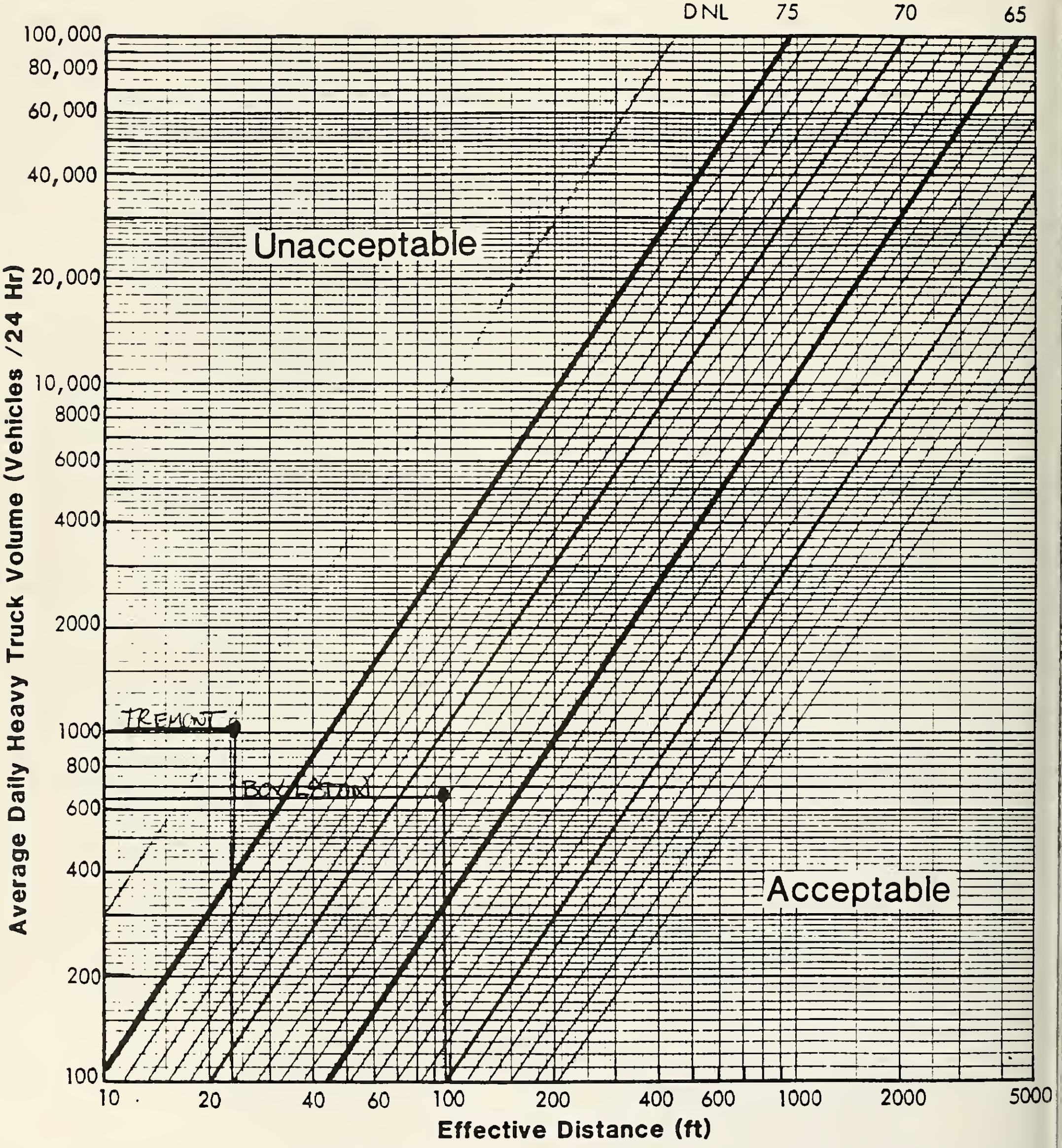
TREMONT ST. = 30,960 AUTOS
DISTANCE = 24 f
BOYLSTON ST = 19,651 AUTOS
DISTANCE = 96 f

AVG. TRAFFIC SPEED = 27 mph
ADJ. FACTOR = 0.26
∴ TREMONT 30,960 x .26 = 8050
BOYLSTON 19,651 × .26 = 5,109

BUILD 1996 36 of 5

BOSTON COMMON

Workchart 2
Heavy Trucks (55 mph)



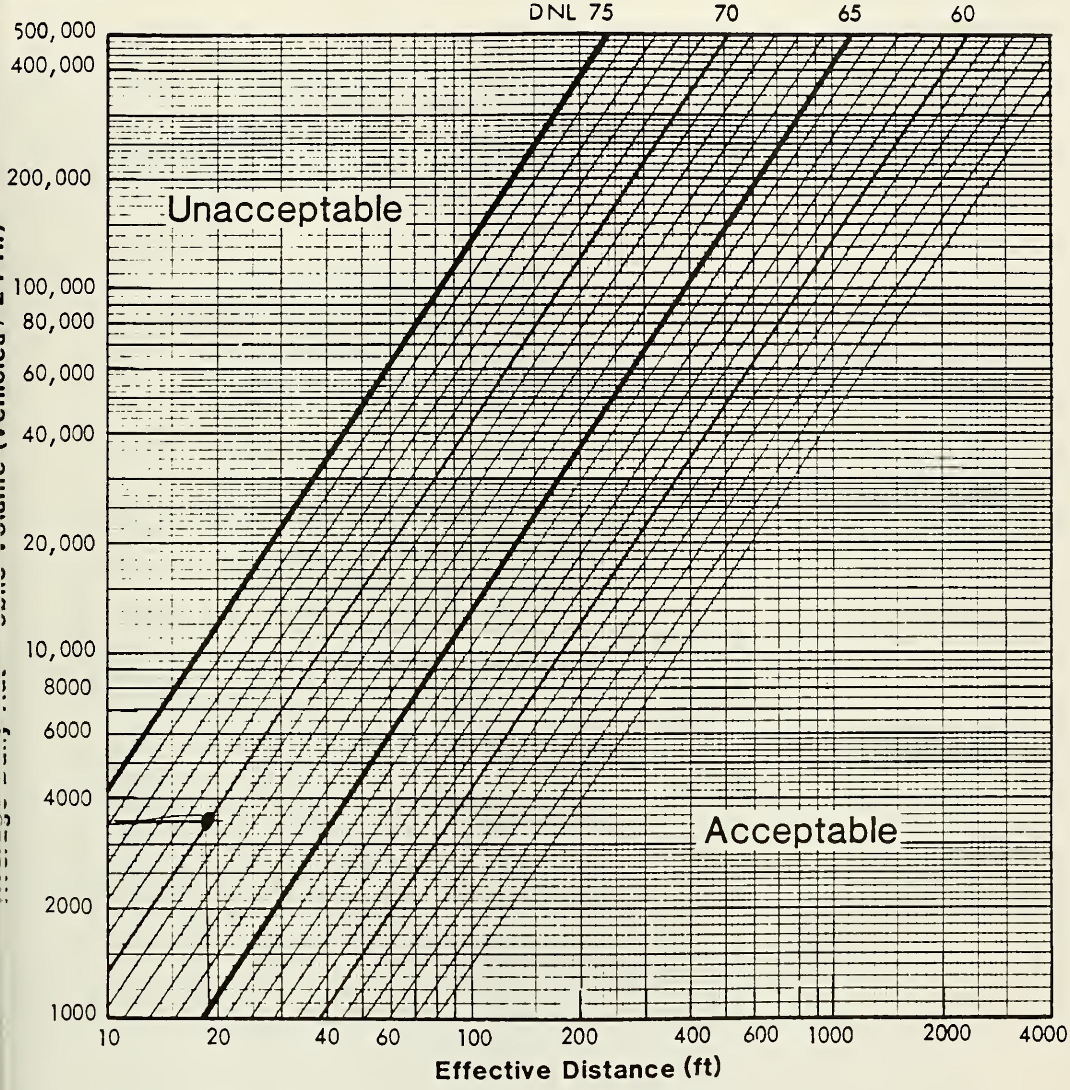
TREMONT ST = 1,290 HEAVY TRUCKS
DISTANCE = 24 f
BOYLSTON ST = 818 HEAVY TRUCKS
DISTANCE = 96 f

AVG. TRAFFIC SPEED LESS THAN 50MI
= 0.81

∴ TREMONT = 1290 HT x .81 = 1,045
BOYLSTON = 818 HT x .81 = 662

BUILD 1996
CHINA TRADE CENTER

Workchart 1
Autos (55 mph)



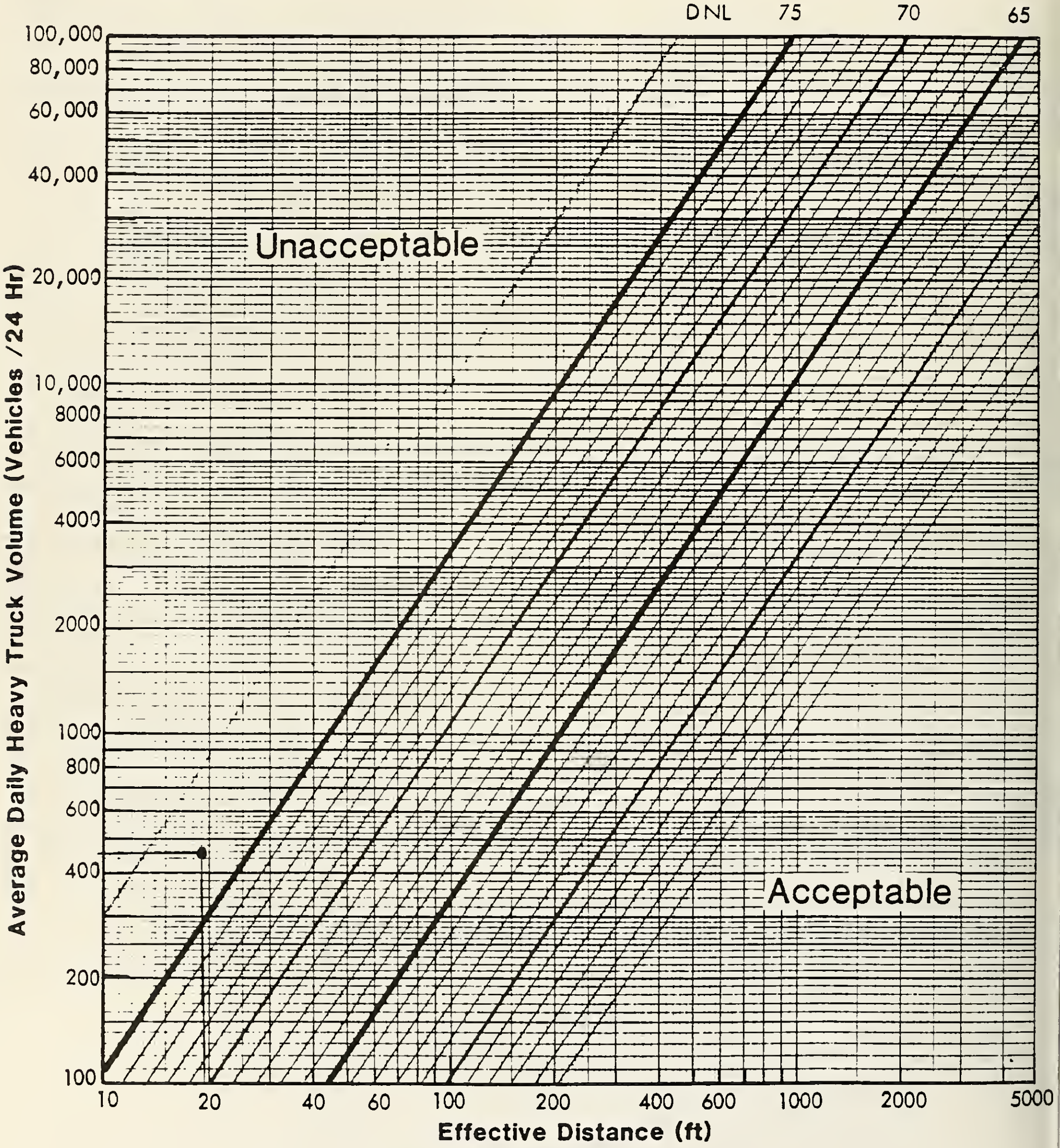
BOYLSTON ST = 13,786 AUTOS
DISTANCE = 19 f
AVG. TRAFFIC SPEED = 27mph
ADJ. FACTOR = 0.26

∴ 13,786 A × .26 = 3,584

BUILD 1996 38 of 51

CHINA TRADE CENTER

Workchart 2
Heavy Trucks (55 mph)

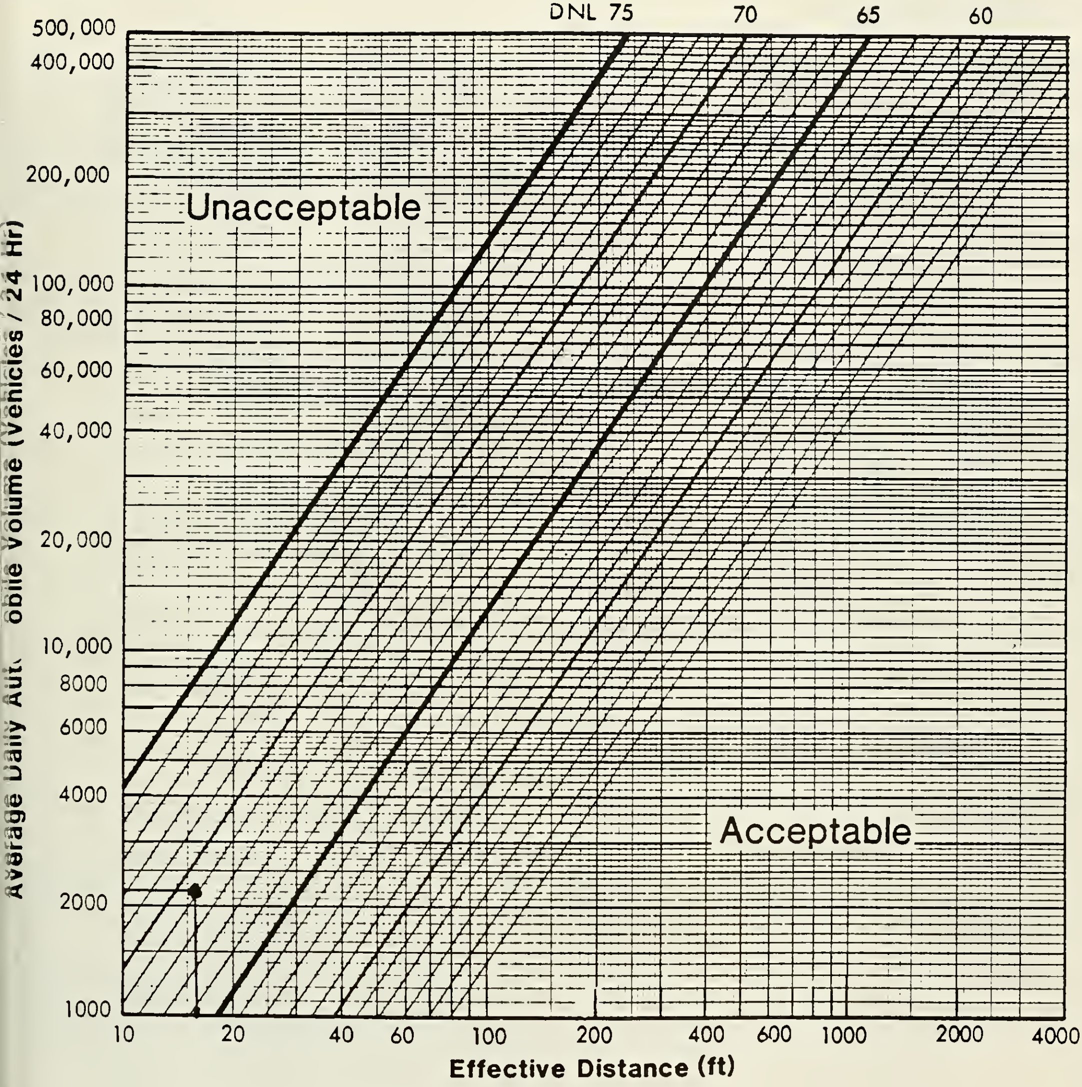


BOYLSTON ST = 574 HEAVY TRUCKS
DISTANCE = 19 f
SPEED LESS THAN 50 MPH = .81
∴ 574 HT × .81 = 465

BUILD 1996

Workchart 1
Autos (55 mph)

RETAIL STORE



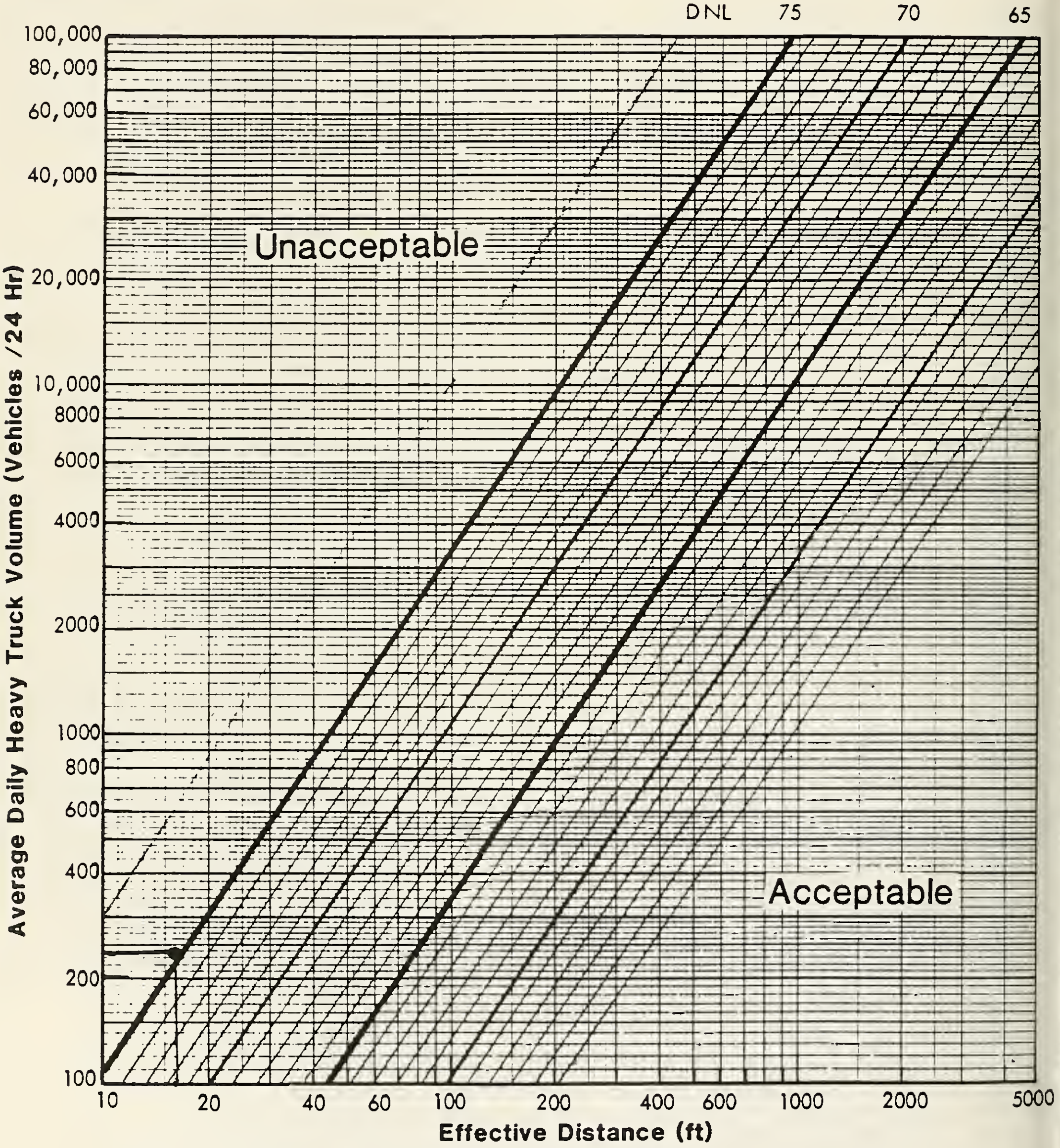
WASHINGTON ST. = 8563 AUTOS
DISTANCE = 16 f

AVG. TRAFFIC SPEED = 27 MPH
ADJ. FACTOR = .26

∴ 8563 × .26 = 2,226

BUILD 1996
RETAIL STORE

Workchart 2
Heavy Trucks (55 mph)



WASHINGTON ST. = 357 HEAVY TRUCK
DISTANCE = 16 f

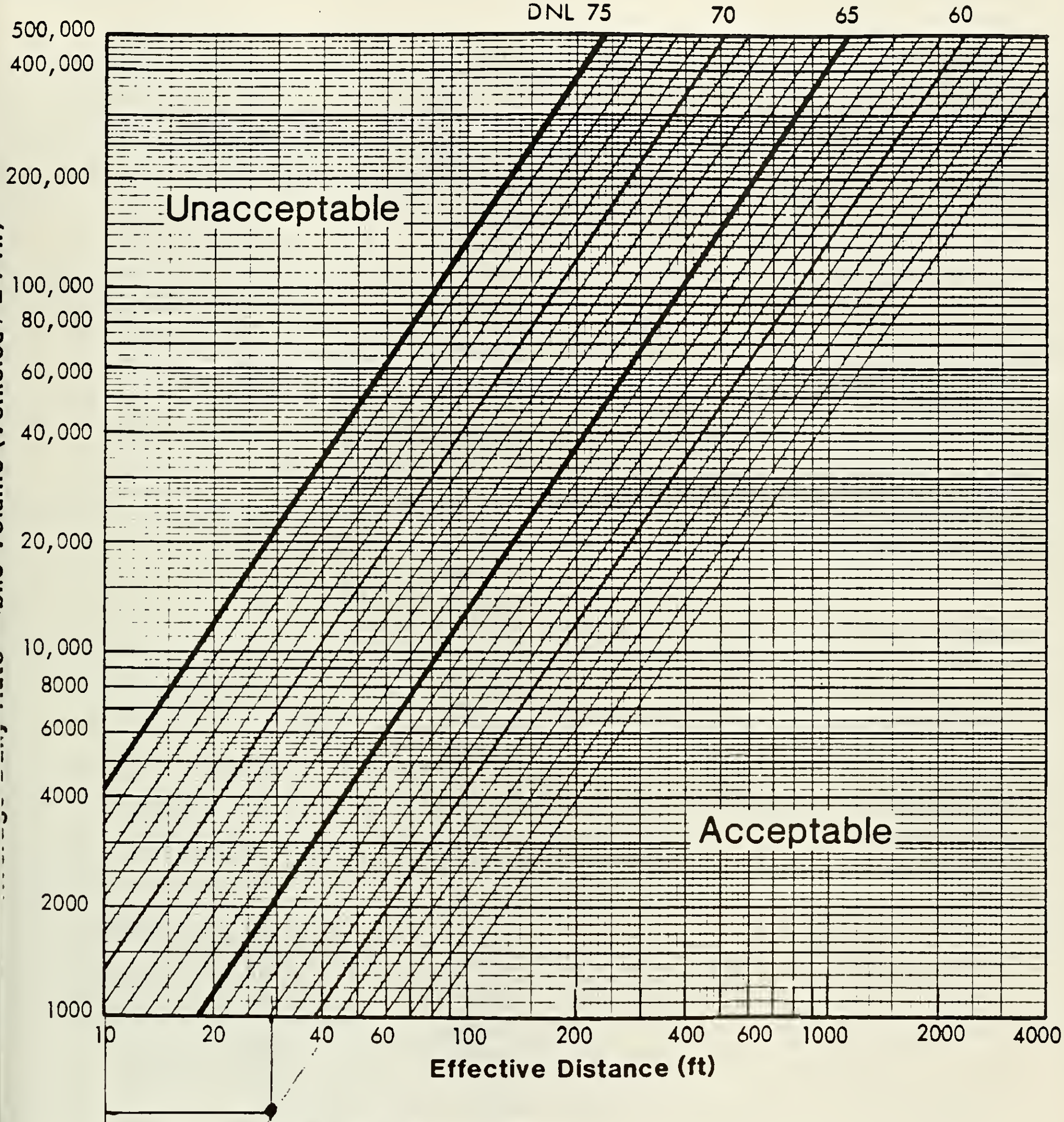
SPEED LESS THAN 50 MPH = 0.81

∴ 357 HT × .81 = 289

BUILD 1996 41 of 51

HOTEL ENTRANCE

Workchart 1
Autos (55 mph)



AVERX ST = 2,208 AUTOS
DISTANCE = 29 f

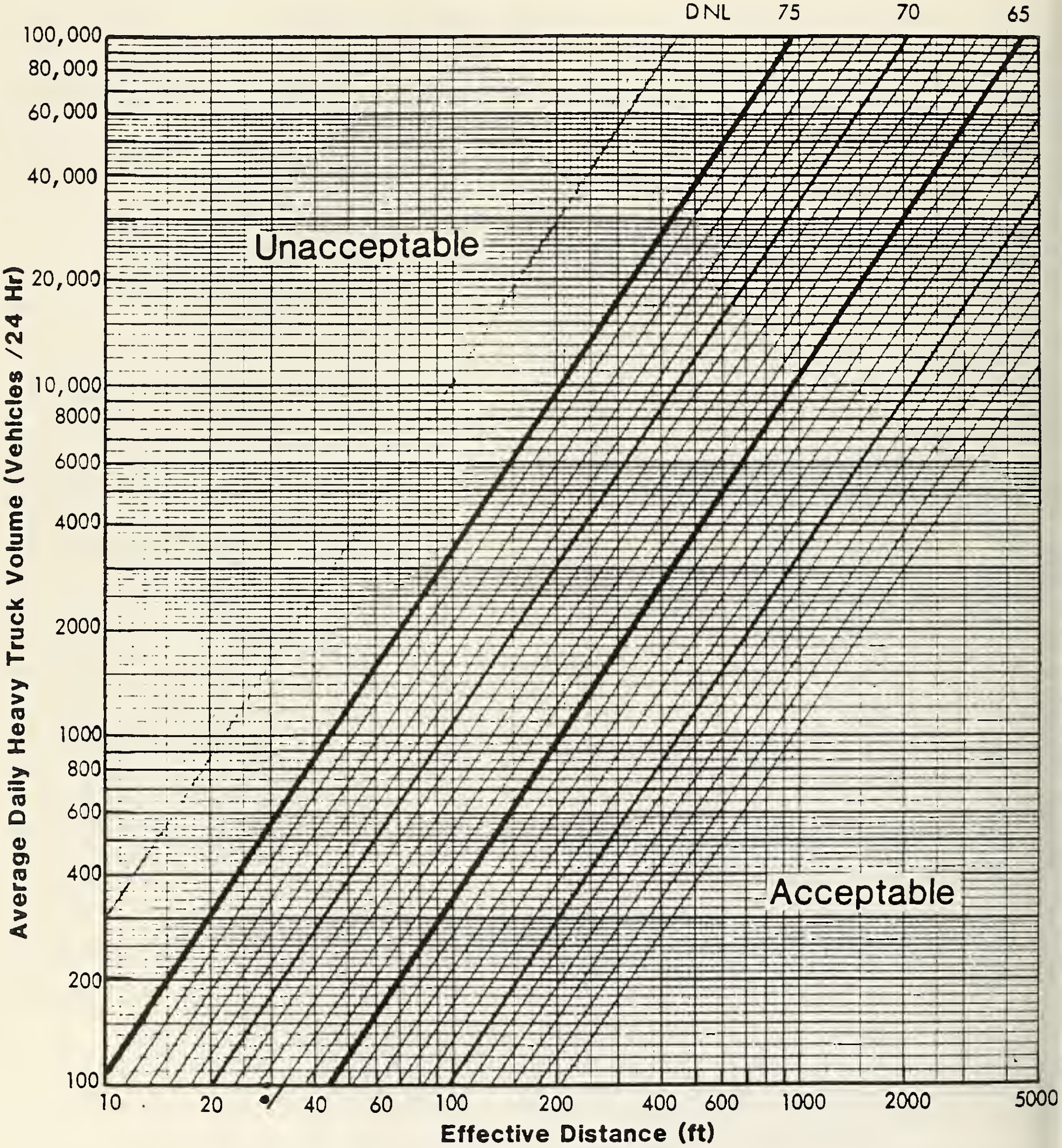
AVG. TRAFFIC SPEED = 27 mPH
ADJ FACTOR = 0.26

∴ 2208 A x .26 = 574

BUILD 1996

HOTEL ENTRANCE

Workchart 2
Heavy Trucks (55 mph)



AVERY ST = 92 HEAVY TRUCKS
DISTANCE = 29 f

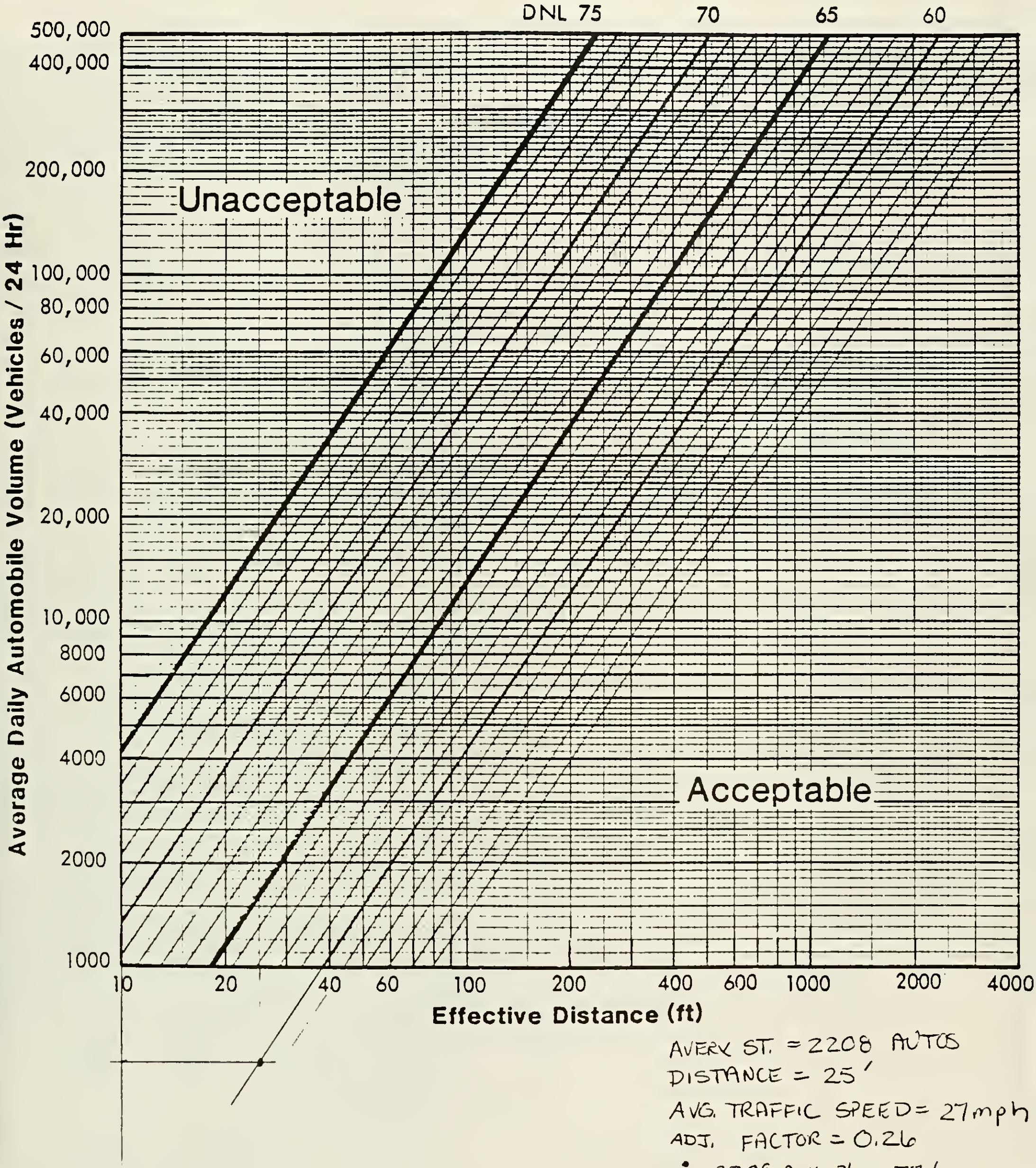
AVG. SPEED LESS THAN 50 MPH = 0.81

∴ 92 HT × .81 = 74

BUILD 1996
MASON PLACE

43 of 51

Workchart 1
Autos (55 mph)



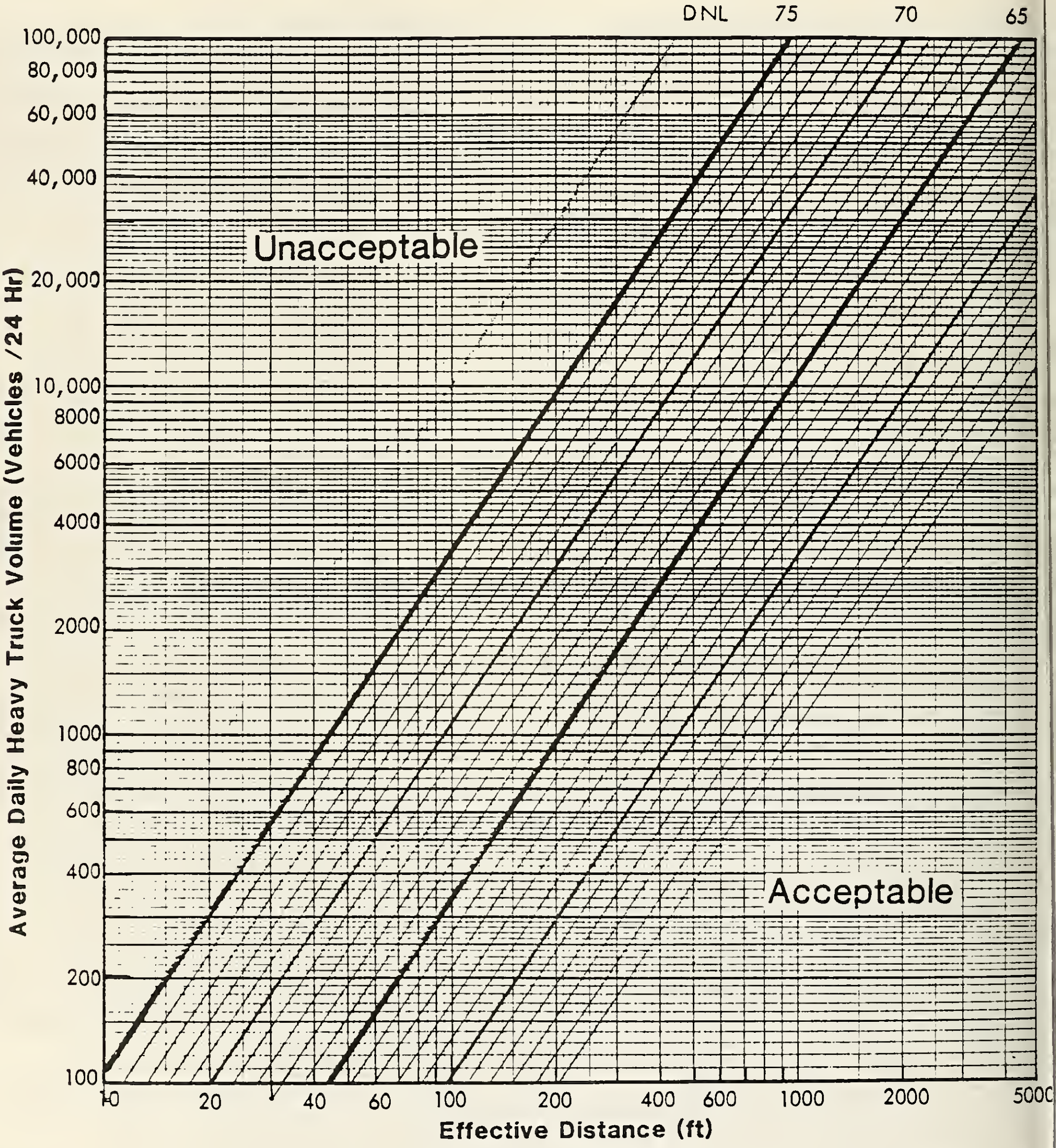
AVERY ST. = 2208 AUTOS
DISTANCE = 25'
AVG. TRAFFIC SPEED = 27mph
ADJ. FACTOR = 0.26
∴ 2208 A × .26 = 574

60

BUILD 1996 44 of

MASON PLACE

Workchart 2
Heavy Trucks (55 mph)



AVERY ST. = 92 HEAVY TRUC

DISTANCE = 25'

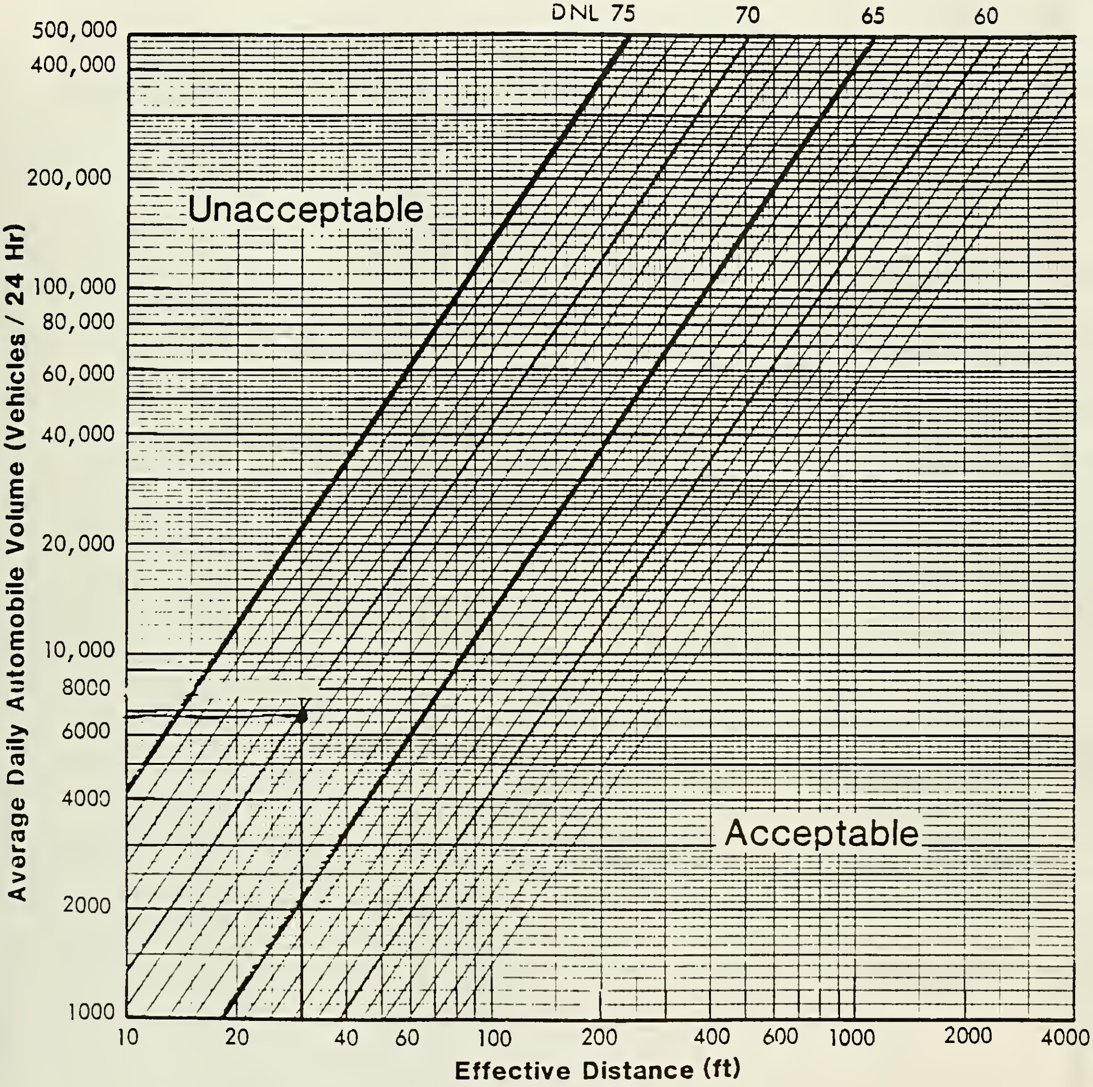
AVG. SPEED LESS THAN 50.mp

∴ 92 HT x .81 = 74

BUILD 1996 45 of 51

PARK SIDE WEST

Workchart 1
Autos (55 mph)

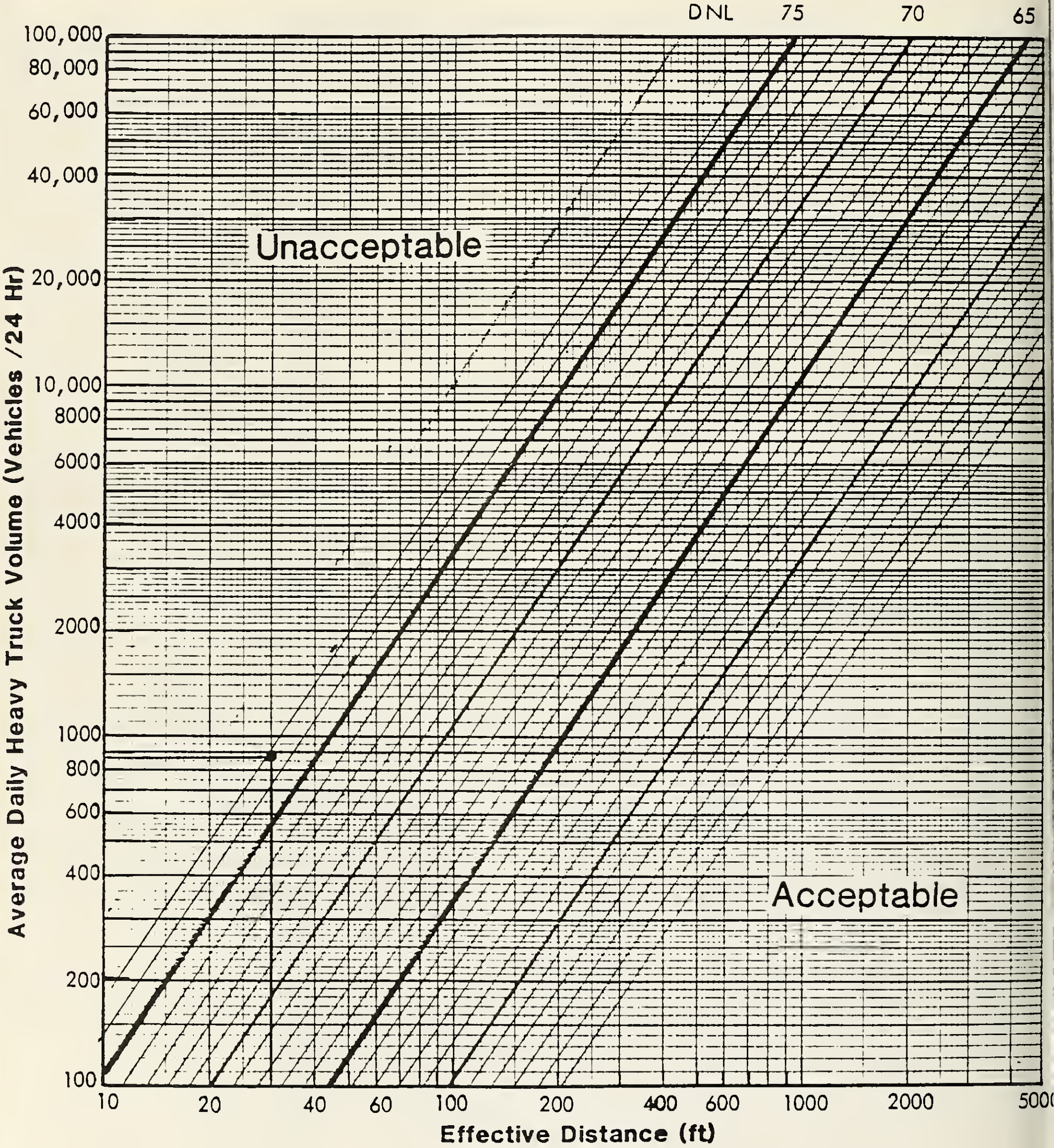


TREMONT ST = 25842
DISTANCE = 30′
AVG. TRAFFIC SPEED = 27 mph
ADJ. FACTOR = 0.26
∴ 25842 × .26 = 6719
70

BUILD 1996

PARK SIDE WEST

Workchart 2
Heavy Trucks (55 mph)



TREMONT ST = 1077 HT.

DISTANCE = 30'

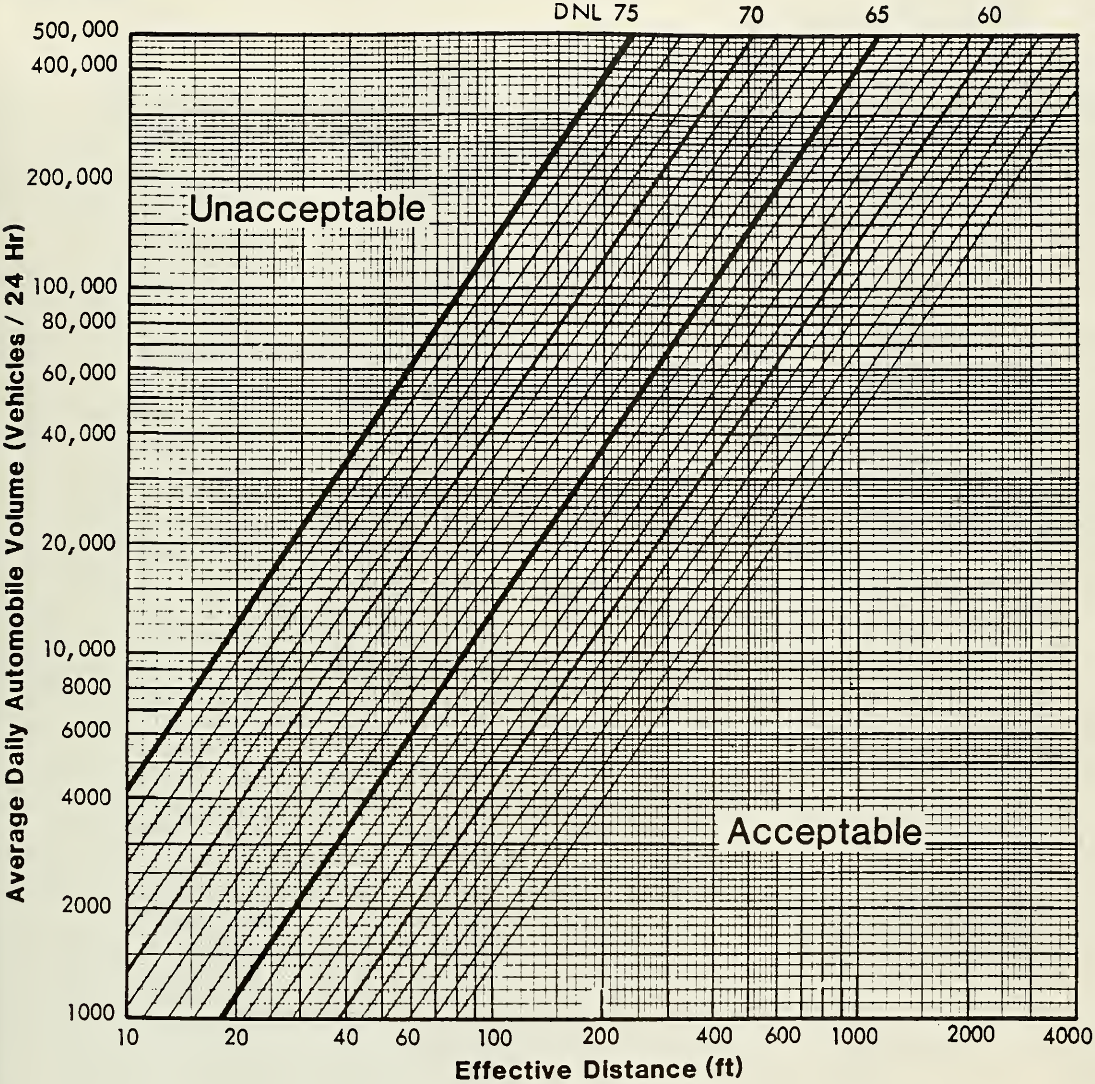
SPEED LESS THAN 50 MPH =

∴ 1077 HT × .81 = 872

MM

Workchart 1
Autos (55 mph)

TREMONT ON THE COMMON

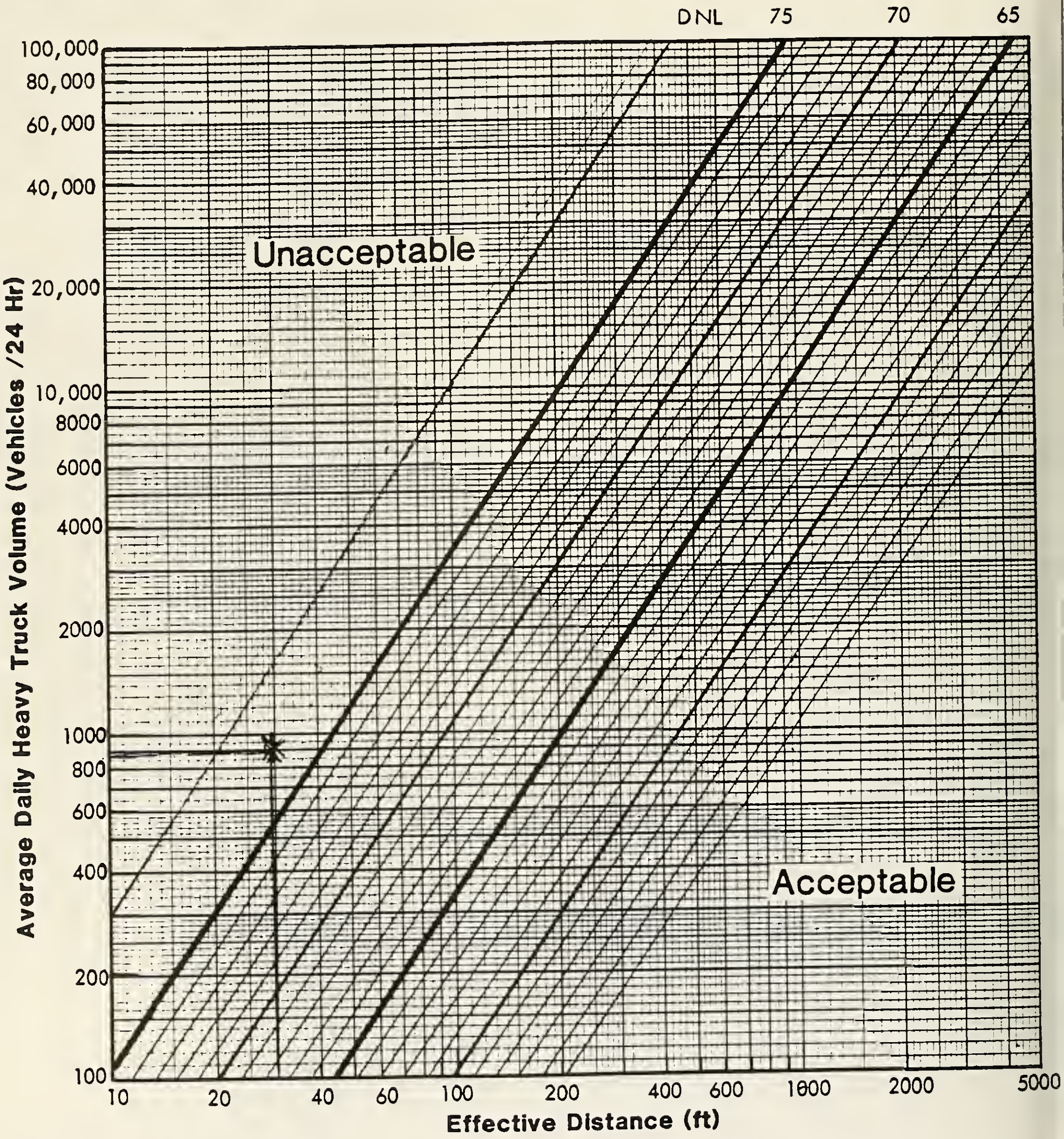


TREMONT ST = 25,842
DISTANCE = 30'
AVG. TRAFFIC SPEED = 27mph
ADJ. FACTOR = 0.26
∴ 25842 × .26 = 6719
70

BUILD 1996 48 of 51

TREMONT ON THE COMMON

Workchart 2
Heavy Trucks (55 mph)



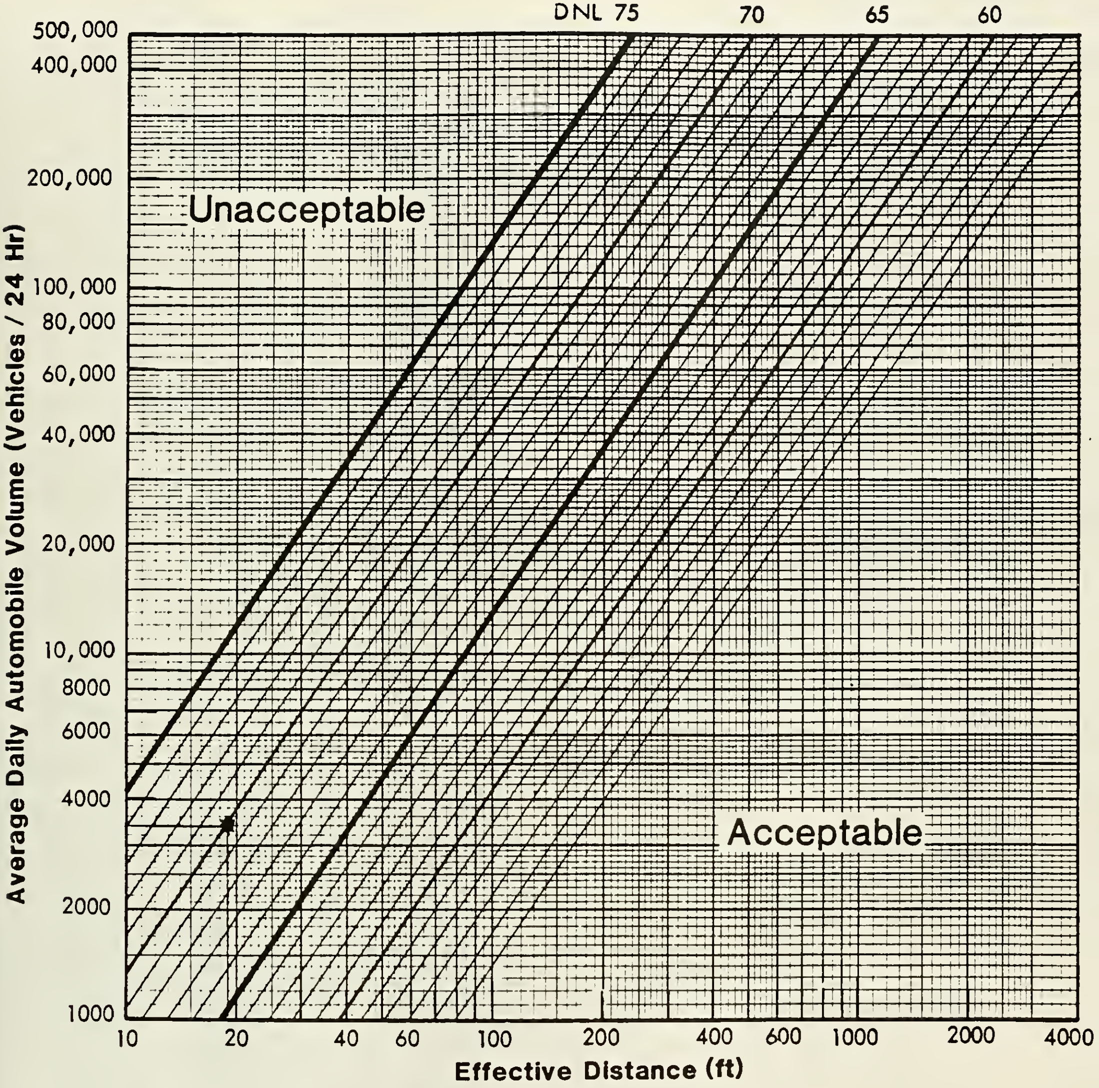
TREMONT ST = 1077 HT
DISTANCE = 30´
SPEED LESS THAN 50MPH =
∴ 1077 HT x.81 = 872

77

BUILD 1996

TOURAINE BUILDING

Workchart 1
Autos (55 mph)

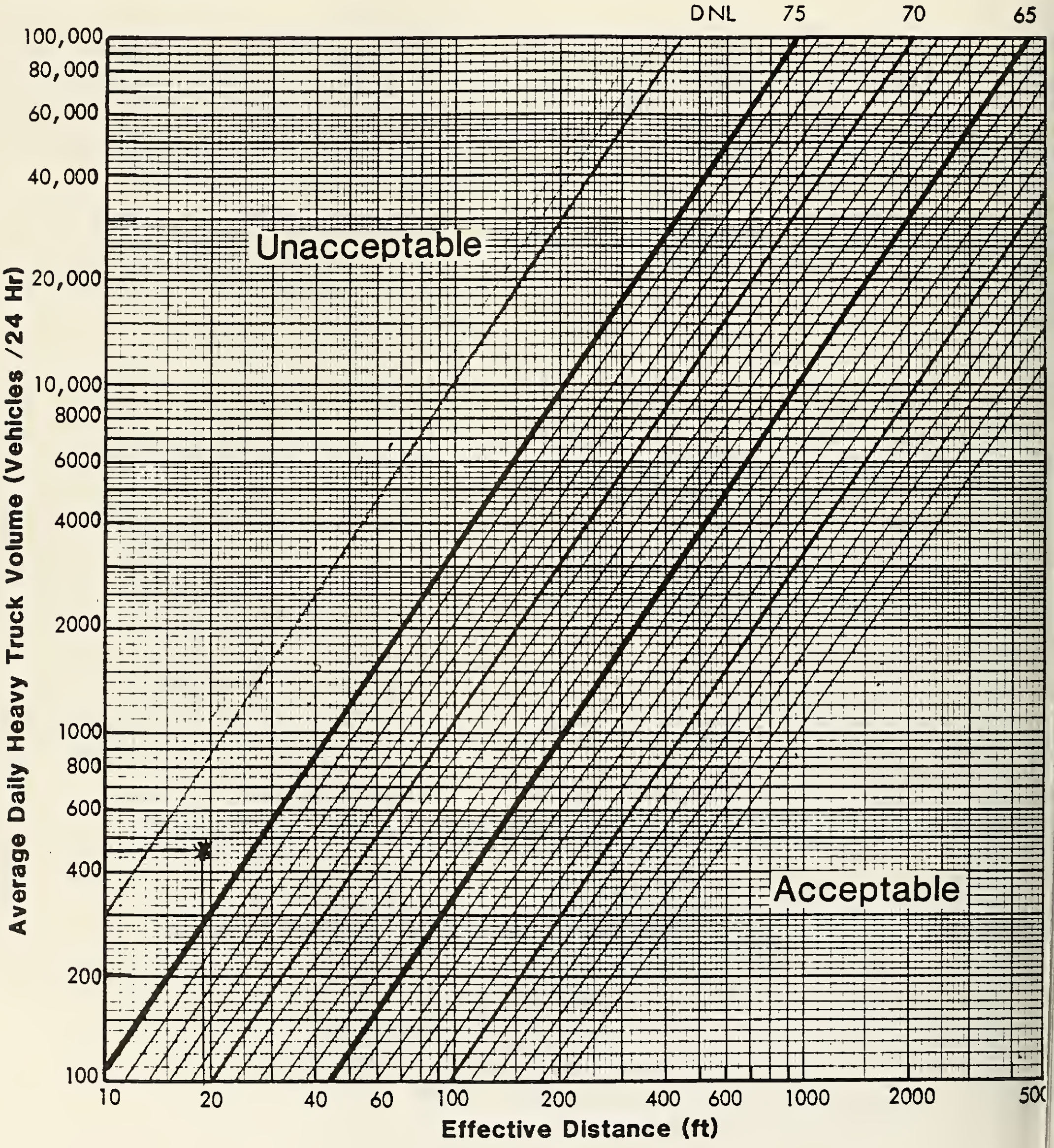


BOYLSTON ST = 13786 AUTOS
DISTANCE = 19 f
AVG. TRAFFIC SPEED = 27 mph
ADJ. FACTOR = 0.26
∴ 13,786A × .26 = 3,584

BUILD 1996

Workchart 2
Heavy Trucks (55 mph)

TOURAINE BUILDING



BOYLSTON ST = 574 HEAVY TRUCKS
DISTANCE = 19f
SPEED LESS THAN 50 MPH = .81
∴ 574 HT × .81 = 465

Sasaki Associates, Inc. **Computation Sheet**

Title COMMONWEALTH CENTER By RL Date 3/29/89
Project no Ck'd Sheet no 51 of 51

BUILD 1996

			DNL
BOSTON COMMON	TREMONT ST.	AUTO	72
		TRUCK	80
	BOYLSTON ST.	AUTO	61
		TRUCK	68
			81
CHINA TRADE CENTER	BOYLSTON ST.	AUTO	70
		TRUCK	77
			78
RETAIL STORE	WASHINGTON ST.	AUTO	69
		TRUCK	75
			76
HOTEL ENTRANCE	AVERY ST.	AUTO	59
		TRUCK	67
			68
MASON PLACE	AVERY ST.	AUTO	60
		TRUCK	67
			68
PARK SIDE WEST	TREMONT ST.	AUTO	70
		TRUCK	77
			78
TREMONT ON THE COMMON	TREMONT ST	AUTO	70
		TRUCK	77
			78
TOURAINE BUILDING	BOYLSTON ST.	AUTO	70
		TRUCK	77
			78

Air Quality

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                      CALINE3: CALIFORNIA LINE SOURCE DISPERSION MODEL - SEPTEMBER, 1979 VERSION

   JOB: COMM. CNTR BUILD '96 PM PK SA #8570.01             RUN: INT #8 TREMONT STREET/PARK STREET


      I.  SITE VARIABLES

     U =  1.0 M/S              CLAS =   4  (D)         VS =    .0 CM/S        ATIM =  60. MINUTES                    MIXH =   8
   BRG =   0. DEGREES            Z0 = 321. CM          VD =    .0 CM/S         AMB =  5.0 PPM


     II.  LINK VARIABLES

      LINK DESCRIPTION        *      LINK COORDINATES (M)       * LINK LENGTH  LINK BRG   TYPE  VPH     EF     H    W    OC
                              *   X1      Y1       X2      Y2   *     (M)        (DEG)                 (G/MI) (M)  (M)
  ----------------------------*---------------------------------*------------------------------------------------------------
  1. L1 TRMNT NoINT SB F      *    0.      5.      90.    128.  *     152.        36.      AG  2530.  28.3    .1  17.1  .00
  2. L2 TREMONT SB  TH Q      *    1.      4.      81.    116.  *     138.        35.      AG  2116.  81.8    .1  13.4  .00
  3. L4 TRMNT SoINT SB F      *  -17.    -12.    -107.   -135.  *     152.       216.      AG  2390.  28.3    .1  17.1  .00
  4. L5 PARK STREET WB F      *  -20.      9.    -114.    130.  *     153.       322.      AG   414.  28.3    .1  10.7  .00
  5. L6 PARK STREET EB F      *  -22.      7.    -118.    126.  *     153.       321.      AG   274.  28.3    .1  10.7  .00
  6. L7 PARK ST EB R Q        *  -22.      7.     -73.     75.  *      84.       323.      AG   274.  81.8    .1  10.7  .00

    III.  RECEPTOR LOCATIONS AND MODEL RESULTS

                              *                                 * TOTAL *            CO/LINK
                              *        COORDINATES (M)          * + AMB *             (PPM)
      RECEPTOR                *       X         Y         Z     * (PPM) *   ○    ●    ♥    ♦    ♣    ♠
  ----------------------------*---------------------------------*-------*-----------------------------
   1. INSURANCE BLDG          *      17.       13.       1.5    * 15.4  *  2.9  7.5   .0   .0   .0   .0
   2. MERCHANT BANK           *       6.       -5.       1.5    * 12.5  *  2.1  5.4   .0   .0   .0   .0
   3. BRIGHAMS                *      -3.      -17.       1.5    *  7.5  *   .8  1.7   .0   .0   .0   .0
   4. DUNCAN DONUTS           *      -8.      -23.       1.5    *  6.7  *   .5  1.0   .1   .0   .0   .1
   5. BOSTON 5                *     -15.      -30.       1.5    *  6.8  *   .2   .4  1.0   .1   .0   .1
   6. FANNY FARMER            *     -26.      -44.       1.5    *  7.7  *   .1   .2  2.0   .1   .1   .2
   7. BOSTON COMMON           *     -23.       -3.       1.5    *  6.0  *   .0   .0   .0   .3   .2   .5
   8. PARK ST. CHURCH         *     -18.       15.       1.5    *  5.1  *   .0   .0   .0   .1   .0   .0
```

```
COMM. CNTR BUILD '96 8 HR. SA #8570.01
60.0,321.0,0.0,0.0,8,0.3048
INSURANCE BLDG
55.0,44.0,5.0
MERCHANT BANK
20.0,-15.0,5.0
BRIGHAMS
-10.0,-55.0,5.0
DUNCAN DONUTS
-25.0,-75.0,5.0
BOSTON 5
-50.0,-100.0,5.0
FANNY FARMER
-85.0,-145.0,5.0
BOSTON COMMON
-75.0,-10.0,5.0
PARK ST. CHURCH
-60.0,50.0,5.0
INT #8 TREMONT STREET/PARK STREET
6,1
1,1
L1 TRMNT NoINT SB F AG
0.0,18.0,294.0,420.0,2024.0,17.9,0.3,56.0
1,1
L2 TREMONT SB  TH Q AG
4.0,12.0,160.0,230.0,1693.0,52.4,0.3,44.0
1,1
L3 TRMNT SoINT SB F AG
-57.0,-40.0,-350.0,-444.0,1912.0,17.9,0.3,56.0
1,1
L4 PARK STREET WB F AG
-65.0,30.0,-375.0,425.0,331.0,17.9,0.3,35.0
1,1
L5 PARK STREET EB F AG
-73.0,24.0,-387.0,414.0,219.0,17.9,0.3,35.0
1,1
L6 PARK ST. EB RT Q AG
-73.0,24.0,-135.0,105.0,219.0,52.4,0.3,35.0
1.0,0.0,4,850.0,3.0
```

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                        CALINE3: CALIFORNIA LINE SOURCE DISPERSION MODEL - SEPTEMBER, 1979 VERSION

    JOB: COMM. CNTR BUILD '96 8 HR. SA #8570.01              RUN: INT #8 TREMONT STREET/PARK STREET


      I.  SITE VARIABLES


     U =  1.0 M/S           CLAS =   4  (D)        VS =    .0 CM/S       ATIM =  60. MINUTES                MIXH =   8
   BRG =   0. DEGREES         Z0 = 321. CM         VD =    .0 CM/S        AMB =  3.0 PPM


     II.  LINK VARIABLES


      LINK DESCRIPTION      *      LINK COORDINATES (M)       * LINK LENGTH  LINK BRG   TYPE  VPH     EF     H    W    DC
                            *   X1     Y1      X2      Y2     *     (M)       (DEG)                (G/MI) (M)  (M)
  --------------------------*---------------------------------*-----------------------------------------------------------
  1. L1 TRMNT NoINT SB F    *    0.     5.     90.    128. *        152.        36.    AG  2024.  17.9    .1  17.1   .00
  2. L2 TREMONT SB   TH Q   *    1.     4.     49.     70. *         82.        36.    AG  1693.  52.4    .1  13.4   .00
  3. L3 TRMNT SoINT SB F    *  -17.   -12.   -107.   -135. *        152.       216.    AG  1912.  17.9    .1  17.1   .00
  4. L4 PARK STREET WB F    *  -20.     9.   -114.    130. *        153.       322.    AG   331.  17.9    .1  10.7   .00
  5. L5 PARK STREET EB F    *  -22.     7.   -118.    126. *        153.       321.    AG   219.  17.9    .1  10.7   .00
  6. L6 PARK ST. EB RT Q    *  -22.     7.    -41.     32. *         31.       323.    AG   219.  52.4    .1  10.7   .00


    III.  RECEPTOR LOCATIONS AND MODEL RESULTS


                            *                                * TOTAL *               CO/LINK
                            *         COORDINATES (M)        * + AMB *                (PPM)
      RECEPTOR              *      X         Y         Z     * (PPM) *   ☺    ☻    ♥    ♦    ♣    ♠
  --------------------------*--------------------------------*-------*-------------------------------
   1. INSURANCE BLDG        *     17.       13.       1.5    *  8.3  *  1.5  3.8   .0   .0   .0   .0
   2. MERCHANT BANK         *      6.       -5.       1.5    *  6.8  *  1.1  2.7   .0   .0   .0   .0
   3. BRIGHAMS              *     -3.      -17.       1.5    *  4.3  *   .4   .9   .0   .0   .0   .0
   4. DUNCAN DONUTS         *     -8.      -23.       1.5    *  3.8  *   .3   .5   .0   .0   .0   .0
   5. BOSTON 5              *    -15.      -30.       1.5    *  3.9  *   .1   .2   .5   .0   .0   .1
   6. FANNY FARMER          *    -26.      -44.       1.5    *  4.2  *   .0   .1  1.0   .0   .0   .1
   7. BOSTON COMMON         *    -23.       -3.       1.5    *  3.4  *   .0   .0   .0   .1   .1   .2
   8. PARK ST. CHURCH       *    -18.       15.       1.5    *  3.0  *   .0   .0   .0   .0   .0   .0
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MESOSCALE ANALYSIS - NO BUILD

ROADWAY LINK		ADT	LENGTH IN MILES	VMT	CONVERSION FACTOR	EMISSION FACTOR	NM-HC TONS/YEAR	EMISSION FACTOR	CO TONS/YEAR	EMISSION FACTOR	NOx TONS/YEAR
TOBIN BRIDGE	NB	60,700.00	3.35	203,345.00	0.0004	0.92	74.83	5.74	466.88	1.24	100.86
(I-93 - RTE.16)	SB	55,500.00	3.35	185,925.00	0.0004	0.92	68.42	5.74	426.88	1.24	92.22
I-93	NB	63,600.00	2.35	149,460.00	0.0004	0.92	55.00	5.74	343.16	1.24	74.13
(TO RTE. 38)	SB	66,900.00	2.35	157,215.00	0.0004	0.92	57.86	5.74	360.97	1.24	77.98
STORROW DRIVE	EB	62,200.00	1.2	74,640.00	0.0004	0.92	27.47	5.74	171.37	1.24	37.02
(MA. AVE-LONGFELLOW BR.)	WB	56,300.00	1.2	67,560.00	0.0004	0.92	24.86	5.74	155.12	1.24	33.51
I-90	EB	67,400.00	2.15	144,910.00	0.0004	0.92	53.33	5.74	332.71	1.24	71.88
(ALLSTON TOLLS-COPLEY SQ.	WB	65,200.00	2.15	140,180.00	0.0004	0.92	51.59	5.74	321.85	1.24	69.53
S.E. EXPRESSWAY	NB	95,500.00	2.65	253,075.00	0.0004	0.92	93.13	5.74	581.06	1.24	125.53
(COLUMBIA AVE.-NEPONSET CIR.)	SB	95,800.00	2.65	253,870.00	0.0004	0.92	93.42	5.74	582.89	1.24	125.92
RTE.1-A	NB	27,400.00	3.1	84,940.00	0.0004	0.92	31.26	5.74	195.02	1.24	42.13
(RTE. 16 - AIRPORT)	SB	28,000.00	3.1	86,800.00	0.0004	0.92	31.94	5.74	199.29	1.24	43.05
TOTAL							663.11		4,137.21		893.75

MESOSCALE ANALYSIS - BUILD

ROADWAY LINK		ADT	LENGTH IN MILES	VMT	CONVERSION FACTOR	EMISSION FACTOR	NM-HC TONS/YEAR	EMISSION FACTOR	CO TONS/YEAR	EMISSION FACTOR	NOx TONS/YEAR
TOBIN BRIDGE	NB	61,473.00	3.35	205,934.55	0.0004	0.92	75.78	5.74	472.83	1.24	102.14
(I-93 - RTE.16)	SB	56,273.00	3.35	188,514.55	0.0004	0.92	69.37	5.74	432.83	1.24	93.50
I-93	NB	64,030.00	2.35	150,470.50	0.0004	0.92	55.37	5.74	345.48	1.24	74.63
(TO RTE. 38)	SB	67,330.00	2.35	158,225.50	0.0004	0.92	58.23	5.74	363.29	1.24	78.48
STORROW DRIVE	EB	62,658.00	1.2	75,189.60	0.0004	0.92	27.67	5.74	172.64	1.24	37.29
(MA. AVE-LONGFELLOW BR.)	WB	56,758.00	1.2	68,109.60	0.0004	0.92	25.06	5.74	156.38	1.24	33.78
I-90	EB	67,858.00	2.15	145,894.70	0.0004	0.92	53.69	5.74	334.97	1.24	72.36
(ALLSTON TOLLS-COPLEY SQ.	WB	65,658.00	2.15	141,164.70	0.0004	0.92	51.95	5.74	324.11	1.24	70.02
S.E. EXPRESSWAY	NB	96,387.00	2.65	255,425.55	0.0004	0.92	94.00	5.74	586.46	1.24	126.69
(COLUMBIA AVE.-NEPONSET CIR.)	SB	96,687.00	2.65	256,220.55	0.0004	0.92	94.29	5.74	588.28	1.24	127.09
RTE.1-A	NB	27,686.00	3.1	85,826.60	0.0004	0.92	31.58	5.74	197.06	1.24	42.57
(RTE. 16 - AIRPORT)	SB	28,286.00	3.1	87,686.60	0.0004	0.92	32.27	5.74	201.33	1.24	43.49
TOTAL							669.27		4,175.65		902.06